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QUEENSLAND AGRICULTURAL JOURNAL

Vol. XXX. JANUARY, 1913. Part 1.

Agriculture.

FARMYARD MANURES AND THEIR APPLICATION.—No. 2.

THE PRESERVATION OF MANURES.

Considering the possibilities of loss in manures kept for a length of time, it may well be questioned whether, under the ordinary conditions of the farm, it is worth while to attempt their storage. The best plan, wherever circumstances will permit, is to haul the manure afield as fast as it is made, spreading it evenly over the ground. Manure thus spread dries out at once in fine weather, and fermentation ceases, while the rains which leach through it carry with them into the soil the soluble constituents of the manure. Even where the field is to remain unploughed for a considerable time, it is more economical, where circumstances permit, to spread the manure upon it in this way than to leave it exposed to the risks which attend ordinary methods of storage. In many cases it will not be found practicable to follow the plan above outlined; the land may not be ready to receive the manure, or conveniences for carting may be wanting. Besides, a fertiliser that acts quickly, as well-fermented dung does, may be wanted for some special crop. These considerations raise the question how best to store manures so that they may be carried on for future use with the least waste.

The two chief sources of waste in manures are due to fermentation and the escape of resultant gases, and to the leaching action of water percolating through the manure mass. The waste through fermentation

or decomposition is always slight—so slight, in fact, that its influence may generally, in practice, be disregarded. The elements of fertility exist in farmyard manures, for the most part, in an insoluble condition. Of nitrogen there is only a small amount in soluble form, while the contained phosphoric acid and potash are largely insoluble; but in any case these valuable minerals can only be lost in appreciable quantity through the action of water. The result of fermentation, then, is to increase the solubility of a manure, and, where this process is a slow one, as is the case in compact piles, the bulk of the ammonia is caught before it can reach the surface, and is held in the form of soluble salts. How the putrefactive changes going on in the manure pile are brought about need not be discussed here at length. Modern science has shown us that, through the agency of various species of microbes, the organic constituents of manures are speedily broken down or "decomposed," and their elements rearranged in new forms. As a result of the activity of these peculiar organisms, the insoluble mass of the manure pile is made soluble, and so available to plants. Nitrogen takes the form of ammonia or nitric acid, and mineral elements are released from combination with materials all taking on the forms easiest available to plants and most easily lost to the farmer.

To preserve manures with the least possible loss while undergoing this fermenting process, a course is open to the farmer which is justified alike by science and sound practice:—

1. The manure must be kept in solid masses. Such compact piles, under ordinary conditions, retain their moisture throughout; fermentation proceeds slowly in them, and the gaseous products of fermentation are retained in the heap. The old-fashioned practice of frequently turning the manure heap, whatever its value in cool climates, ought to be abandoned in Queensland, because of the inevitable waste which attends it.

2. The manure pile must be so placed that water cannot leach through it, either into the ground beneath or out upon the surface. Ordinarily, the annual rainfall will do no more than keep the manure suitably moist. The danger of leaching is to be expected rather from the water which flows upon the manure from a higher level. Necessary measures must be taken to prevent this, either by diverting the water from the manure by means of ditches, or by locating it so that precautions of this kind are unnecessary. The need of an abundant supply of litter to retain the urine and other liquids of the manure will be apparent from the above considerations. The escape of these liquids into the ground beneath will be prevented by making it impervious to water, by the addition of a layer of wet clay thoroughly puddled with the hoe; and, if a concave form be given to the bottom of the yard, loss from leaching by water will be small indeed. The farmer who keeps his stable manure in masses made solid by the tread of

animals or by other means, meanwhile cutting it off from the inflow and outflow of water, will have small cause of complaint of loss in storing manures for limited periods of time, even in hot and warm seasons.

APPLICATION OF MANURES.

The constant tendency of manurial elements, particularly all forms of nitrogen, towards lower levels in the soil, through the action of water, until they pass beyond the reach of plant roots or escape from the soil completely in drainage water, has already been pointed out. This fact furnishes the reason for modern methods of applying fertilisers. The old practice was to haul the manure afield, dump it in heaps, and afterwards spread the heaps as suited the convenience of the farmer. These heaps became at once the seat of active fermentation, and the products of fermentation were rapidly carried into the ground directly beneath the heaps with each recurring rain; moreover, unless great care was practised, the heaps were not likely to be equally distributed over the ground, the finer and best-rotted portions remaining about the position of the heap, giving to the crop following a spotted appearance caused by overgrowth at these points.

It is best, therefore, where circumstances permit, to spread the manure directly from the cart—a practice which has an additional advantage in being economical in labour.

The following rules for the application of manures serve to illustrate principles as well as the best practices of modern farmers in this regard:—

1. Heavy application of manure at one time is almost certainly wasteful. Small doses, and often, should be the rule with fertilisers, whatever their nature may be. Better far to give the land 10 tons of manure for three years in succession than 30 tons once in three years. The loss and dissipation of manurial elements in the soil go on constantly, while the crop feeds only at certain seasons of the year. Excessive manuring is wasteful, because it loads the soil with plant food beyond the present requirements of the growing crop, while the waste from large masses of manure in the field is large and constant. Modern methods bring us constantly towards the Eastern method of manuring the plant rather than the soil. Certain crops, again, are notoriously gross feeders, making constant and large demands on the resources of the soil, and showing, by rapidly diminishing yields, any failure on the part of the soil to meet their natural demands. These are, for the most part, coarse-growing, broad-leaved plants like the banana, sugar-cane, maize, and (among vegetables) the cabbage, cauliflower, and beet. With these crops it is difficult to overdo with manures, although the crop may be damaged in special products like the sugar of the cane and beet by a too generous application of nitrogenous manures.

2. Whenever practicable, haul the manure to the field as fast as made, and spread directly from the dray. This is economical in practice and sound in principle. There is no danger of loss from the escape of the volatile matters of manure that is in direct contact with the soil.
3. The more nearly manure is kept to the surface of the soil, and the more thoroughly it is mixed with it in cultivation, the better. Probably the best treatment that can be given manure on the soil is to spread it on the ploughed ground, and afterwards work it into the soil with the harrow or cultivator. The subsequent tillage operations in connection with the growing crop generally forbid this course, and make the ploughing under of the manure a necessity.
4. In respect to the time of applying manures to the crop, hard-and-fast rules are difficult to make. In a general way, well-rotted manures and others, such as horse or sheep manure which are quick in action, had better be applied in the spring, or at such time as to meet the immediate requirements of the crop. Crops, however, vary enormously in respect to their manurial requirements. A grain crop manured in the spring is often stimulated to a late growth of rank, feeble straw, which gives a diminished yield of grain. Other crops—fruit trees, pineapples, bananas, &c.—often demand the forcing effects of manure late one season in order to make the crop of the next. In the climate of Queensland manures, as a rule, may be applied with the expectation of receiving quick returns for the application.

In a discourse delivered by Mr. A. D. Hall, F.R.S., before the Royal Institution on 24th May, 1912, he alluded to the "Duration of Fertility of the Soil and to Over-manuring" as follows:—

"The question of the duration of the fertility of the land under continual cropping is exciting attention at present, as the United States has begun to take alarm at the reduced reproduction of some of its most fertile lands. As a rule, all virgin soils are not rich, and the system of cropping alternately has reduced great areas to such a poverty-stricken condition that it has been allowed to go derelict.

"EXPERIMENTS ON WHEAT, BROADBALK FIELD, ROTHAMSTED.

"AVERAGE PRODUCE OF GRAIN, FIRST EIGHT YEARS (1844-51) AND THE SUCCESSIVE TEN-YEAR PERIODS, 1851-1911.

Plot.	Manure.	Averages over							
		8 Years, 1844-1851.	10 Years, 1852-1861.	10 Years, 1862-1871.	10 Years, 1872-1881.	10 Years, 1882-1891.	10 Years, 1892-1901.	10 Years, 1902-1911.	60 Years, 1852-1911.
		Bush.	Bush.	Bush.	Bush.	Bush.	Bush.	Bush.	Bush.
2	Farmyard manure	28·0	34·2	37 5	28·7	38·2	39·2	35·1	35·5
3	Unmanured	17·2	15·9	14·5	10·4	12 6	12·3	10·9	12·8

"The results of this plot show two principles at work:—The tendency of the land under an unchanging system of farming to reach a position of equilibrium when the only variations in the crop are those brought about by seasons; and, secondly, that regeneration of the nitrogen stock in the soil is possible by natural causes alone.

"OVER-MANURING.

"We now turn to one of the other plots which receives an excess of farmyard manure each year. The manure supplies about 200 lb. of nitrogen per acre, the crop only taking away about 50 lb., so that naturally the land is increased in its fertility.

"BROADBALK WHEAT FIELD—NITROGEN IN SOIL, LB. PER ACRE.

In Soil, 1865.	In Soil, 1904.	Gain or Loss in 39 Years.	Added in Manure.	Added in Rain.	Removed in Crop.	Unaccounted for.
			Plot 3.—Unmanured.			
2,850	2,290	—560	...	50	600	—110
			Plot 3.—Farmyard Manure.			
4,470	4,970	+500	7,800	150	1,990	—5,460

"The soil has been getting richer for the last twenty or thirty years, and the greater part of the nitrogen is wasted because bacterial action sets the nitrogen free as gas. There is another principle illustrated here: That in very rich land the wasteful agencies are so speeded up as to prevent any continued accumulation of fertility out of the unused residues of the manures put on. Higher fertility means a higher level of waste."

THE COWPEA AS A SEED CROP.

By G. B. BROOKS, Instructor in Agriculture.

[CONTINUED FROM DECEMBER ISSUE.]

HARVESTING.

It may be remarked that, up to the time of harvesting, no other crop is easier raised or requires less attention than the crop under review. On the other hand, the expeditious handling of such for seed is one of the most difficult and troublesome. Were it not for this fact, the price of seed would in all probability be much less than that at present ruling.

The method to be adopted in securing the seed depends largely on circumstances. To the struggling farmer, whose stock of machinery is perhaps on a more limited scale than his family, harvesting by hand is recommended. It must be admitted that this method is somewhat tedious, but not more so than that entailed in the handling of such crops as cotton, coffee, peanuts, or, in fact, most of our market-garden crops. To illustrate this point, I will relate an incident that happened not so very long ago. A tradesman bought a small place of 20 acres, and came for

advice as to what to grow to make a living. Among other things, I recommended an acre of cowpea. Those were duly planted. The next occasion on which we met was when he had commenced to harvest the crop. His greeting was: "Nice little game you got me on. Of all jobs, picking cowpea is about the most tedious. No more cowpea for me." I inquired as to whether the return would not compensate him for the labour involved, but argument was useless; he was emphatic that he had grown his first and last cowpea crop. Six weeks later we met again. I imagined that I had heard the last of cowpea, but judge of my surprise when his first words were: "By jove! that acre of cowpea did not turn out too bad after all. I cleared over £30 off that lot, and am putting in 2 acres next season."

There is no question but that the harvesting of such crops as cowpea, cotton, coffee, and even potatoes is rendered much more tedious through careless and slipshod methods. It is quite customary to see the labourer with the bucket grasped securely in his left hand, while the right only is used in gathering the crop. This manner of working should not be tolerated for one moment. The bucket should be placed on the ground and both hands brought into action, thereby performing at least 50 per cent. more work.

When two pickers are at work on a patch of cowpea, a galvanised-iron tub should be used, each picker taking a row with the tub between. The pods should be tipped out on a sheet or on a few bags, at intervals along the row, and bagged up later on.

Where large quantities are being harvested, a more speedy way for those who have got the conveniences is to cut with a mower and rake into windrows. In the event of the crop being tangled, the mower will be practically useless, the only alternative then being a sharp hoe. Should the pods be very ripe and brittle, the mowing machine should only be used in the morning.

THRESHING.

The ordinary grain thresher cannot be used for this crop. Not only does it choke up, but a very large proportion of the peas will be split. A thresher specially made for cowpea is in use at the State Farm, Roma, and doing excellent work. In construction it is somewhat similar to the peg-drum, but, instead of pegs, there are strippers or beaters attached, made out of 3 by 2 timber.

To prevent splitting, the speed is reduced considerably from that at which an ordinary thresher is worked.

In the event of a machine not being available, there is little difficulty in threshing out by hand. When the dry pods are exposed to the sun for a few hours, the slightest touch will cause them to open. For small quantities a flail or beater is sufficient. In the case of large areas that have been harvested with the mower or hoe, the vines can be spread out on a sheet and the farm roller brought into use.

Cowpea vines make an excellent fodder, and, should the plants be at all fresh—retaining their leaves—the entire crop can be run through the chaffcutter; the seed being afterwards sifted out.

I may here refer to an expedient I have often used in connection with Velvet and Mauritius beans, and which may be of some benefit to those who are raising such plants for seed. The pods, which are very tough and difficult to shell, are, after being spread in the sun for a few hours, given a good sprinkling of water by means of a can. This wetting while hot and dry has the effect of causing the pods to open of themselves.

A FEW REMARKS ABOUT RHODES GRASS IN CENTRAL COASTAL QUEENSLAND.

By J. W. JACKSON, Rockhampton.

As a grower of this splendid grass for several years for stock purposes, I have found it by far the best of all grasses. I have planted it side by side with Paspalum, with the result that Rhodes flourished and spread, while Paspalum was scarcely to be seen. Of course, both these grasses thrive best in their different surroundings. Rhodes likes fairly high and dry conditions, while Paspalum thrives best in low, damp places, where Rhodes would drown out. During last drought I was keeping one and a-half head of mixed stock to the acre and supplying cream all the time, besides which the cattle were nearly fat, while all round you could hear of cattle dying for want of feed.

What I like about the Rhodes is that, during very hot weather, it wilts a little during the heat of day, but always freshens and becomes green and nutritious when the heat of the day is over. I believe in sowing from 4 to 5 lb. per acre for the following reasons: Firstly, by so doing, you get a good strike and smother all weeds, thereby giving you a good paddock from the start, and in three months from sowing, in favourable weather, you have a paddock from 2 to 3 feet high. Secondly, by sowing it well down, your grass does not grow into runners, but shoots straight up, thus giving you more feed per acre and of a better quality, as the runners do not produce as good grass as that from the root, it being much coarser and the runners are pulled up more easily than the main root. Of course, all stock should be kept off it for at least three months to enable it to get root hold. I have experimented with several other grasses—namely, Paspalum, Blue Grass, Mitchell, Canary, and Prairie; but Rhodes is far ahead of all these. By proper changing of paddocks and not overstocking, you will find the Rhodes is a permanent grass. At the present time I have Rhodes in places 5 feet high, and as thick as the ground will carry it—in fact, I can safely say that my paddocks are second to none in the district, and are a perfect picture to see. As long as I have Rhodes, I fear no drought, but I admit that it would be wiser to conserve a bit of fodder, although I have not done so yet. Another thing, I find that with having plenty of green feed my cattle are not troubled so much with ticks. I believe it is over three months now since they were treated for ticks, and there is scarcely a tick to be seen, and this is ideal weather for them. So I believe that, by keeping the tick from breeding and securing plenty of green feed, it is

possible to destroy the tick altogether. I have noticed one thing while in other countries:—That where cattle have been fed on poor fodder, when feed was very scarce, they were troubled with lice; but when spring came, and with it plenty of green feed, the lice disappeared, which showed that it was the cattle being poor that bred the lice.

MARKET GARDENING IN THE MINING DISTRICTS.

By HOWARD NEWPORT, Instructor in Tropical Agriculture, Cairns.

The mining districts on the coastal ranges, on the tablelands, and in the hinterland generally of our coastal agricultural belt in North Queensland are generally considered as quite useless for any agricultural purposes. In a general way, and for any extensive operations, this is so; even if pot plants and flowers are desired, the soil must be imported, it is said, and a garden is not to be thought of. At first appearance the conditions certainly seem most forbidding from the agricultural standpoint; the rocky barren hill sides of granite boulders and disintegrated felspatic gravel do not seem capable of permitting Nature herself to produce anything in the way of foliage. Yet it is surprising what can be done (and is being done in isolated cases) by a little assistance to Nature. Nature is willing, and it is only the ground that is weak.

These soils are often rich in potash and phosphoric acid, and some in lime also, and are mainly deficient in humus. Now, humus is only vegetable matter in another form—almost any perishable refuse may be turned into just the material needed to make all the difference in the productivity of these seemingly hopeless soils. A great deal of such material—from sawdust, straw, shavings, and packing material to house refuse and stable manure—is available and yet going to waste. The soil, in short, need not be imported for a small garden, though it does need to be made—*i.e.*, built up from such waste matter.

Were a small compost pit dug and reserved for the reception of such rubbish—including weeds, dead leaves, the dust from the wood heap, kitchen refuse, ashes, and any animal manure available—and the pit watered from time to time (not flooded) and covered with fresh soil every now and then, a rich dark mould would be formed largely consisting of humus. This, on being emptied every few months and mixed with the surface soil of the garden patch, or used for potting plants, would soon show most gratifying results in the production of either refreshing nosegays or the more humble but toothsome cabbages.

In most cases these mining fields and settlements are at elevations of 1,200 to 2,500 feet above the sea, and, though the rainfall may be small, water is for the most part to be found, and the climate is eminently favourable to the growth of many flowers and temperate climate vegetables as well as the semi-tropical ones.

In these apparently forbidding soils many varieties of fruit trees can often be quite successfully cultivated. The soil will always need breaking

up, and the pit in the first instance may be hard to dig; but, subsequently, trees which it is not possible to grow in the far richer soils of the hotter areas near the sea-coast may, at this elevation, be brought into successful, regular, and even heavy bearing.

In such localities, also, a little searching will reveal, here and there in the secluded valleys, patches of alluvial soils, small certainly, but aggregating many acres, frequently sandy, but flat or nearly so, and quite capable of successful cultivation under fruit or market gardens. These patches are generally easily worked, and have permanent water-holes near them; hence require but little farming to make them veritable oases in a metalliferous desert of hills.

The accompanying illustrations show one such—a patch of perhaps 10 acres of alluvial, cultivatable soil—a mile or so out of Wolfram, which is a small mining township set in a sea of rocky hills and reached by a 15-mile coach ride from Dimbulah, on the Mareeba-Chillagoe Branch Line.

Some 2 acres here have been cultivated by Mr. W. A. Gilder, of Wolfram, who started a small general farm, market garden, and piggery some three or four years ago, and proved it a great financial success. Of this area Mr. Gilder has now about ¾-acre under English potatoes, which did well last year and promises better this; ½-acre under citrus fruit trees, recently planted under the guidance and advice of the local State schoolmaster; and the other ¾-acre under vegetables of all sorts, bananas, root crops for the pigs, &c. So satisfied is the owner that he is now clearing and breaking up another 3 acres adjoining, on which he proposes planting corn as a first crop and probably fruit trees to follow.

All fruit and vegetables for this township have to be brought in by train and coach from long distances, so that for all produce grown there a ready local market exists at good prices.

This agriculturist, early in this season, was troubled with a plague of caterpillars and small red beetles, and found he was likely to lose most of his vegetable crops; for what the caterpillars did not attack, the beetles did. He states that at least 1,000 young cabbage seedlings, &c., some planted out and some in the seed beds, were destroyed or so damaged that they could only be used for the pigs. To remedy this, he tried a solution of carbide lime, the waste after making acetylene gas. This lime, while still fresh and of the consistency of cream or paint; he diluted with about five times its quantity of water, and having no spray pump simply splashed it over his remaining vegetables with wonderfully successful results. At this strength he found his cabbages, pumpkins, and all other vegetables freed from the pests and not themselves in any way damaged, with the one exception of the seedling lettuces, for which he found he had to use the solution at half the above strength. He has now got a spray pump, and declares he will always have this simple remedy on hand. When visited, the garden was certainly looking well.

The plants were clean and growing luxuriantly, the proprietor being justly proud of his cabbage patch depicted in Fig. 1 of the illustrations.

This illustration also gives in the background some idea of the nature of the country, which, it may be seen, is forest and not scrub. That such may be turned to excellent account is well shown in both illustrations, especially perhaps in Fig. 2, showing good growths of bananas, beans, beetroot, lettuce, herbs, and even celery.

Fig. 1.—Mr. W. A. Gilder's Cabbage Patch at Wolfram.

Fig. 2.—Market Garden in an Alluvial Soil Pocket near Wolfram, N.Q.

PLATE 1.—MARKET GARDENING IN THE MINING DISTRICTS.

Manure is, of course, advisable and necessary for such market gardening; besides the pig and other manure on the farm, the more readily transportable artificial manure and oil cakes are used in this case.

In the fruit line, apples, grapes, citrus fruit, bananas, pawpaws, pineapples, &c., may be grown. Although the areas in such mining districts suitable for agriculture are small and restricted to small patches of alluvial flats here and there along the creeks, it is quite possible to carry on market gardening and poultry and pig farming on a remunerative scale. The market would be in every case a local one, and by no means unlimited; but prices are good, and there are openings for quite a number of small mixed farms, the land for which only needs seeking out and taking in hand.

Apart from the obvious payableness of such undertakings, attention to the culture of fruit and vegetables in a small way in the back gardens, under even such seemingly forbidding conditions, would meet with a surprising amount of success if properly approached, and is worthy of consideration if only from the point of view of the health of the community and of the children living in similar mining centres.

HINTS TO NEW SETTLERS.

By THE EDITOR.

The following notes are principally intended for the instruction of such settlers on the land as have had no previous experience of bush life, and more particularly for those who have taken up either scrub lands or forest lands which are more or less timbered. They scarcely apply to settlers on wide, treeless plains. In the early days of colonisation in Queensland large areas of scrub lands on the banks of rivers and creeks were purchased by new arrivals from the old country, for the reason that the soil in these localities was found to be of surpassing richness, whilst the forest lands, unless consisting of alluvial flats, were neither so rich nor so easy to work by hand labour. Another reason for the preference for scrub lands was that the dense jungle of the scrubs consisted of lighter and softer timbers than those of the open forest. To this was added that, once the scrub was felled and burnt off, the deep rich soil, consisting principally of decayed vegetable matter, was easy to work with a hoe, and every year the innumerable stumps became less in number owing to their rapidly rotting out; and when eventually the remaining stumps were taken out to admit of the use of the plough, the labour of stumping was far easier and more quickly performed than where large hardwood stumps, with their immense spreading roots and great tap roots, had to be extracted from the hard forest soil. And the same reason for selecting scrub land or alluvial and volcanic downs country (such as the Darling Downs) holds good to-day.

Another great advantage of the scrubs was that they contained large quantities of valuable marketable timber, such as Moreton Bay pine,

Kauri and Bunya pine, red cedar, beech, yellowwood, silky oak, and others. These timbers abounded in all the scrub lands from the Logan and Albert, Pimpama, Coomera, Nerang, Brisbane, and other Southern rivers, away up to Noosa, the Mary, Burnett, and so on right up to the Far Northern rivers, from the Herbert to the Barron. Many of the inland scrubs, such as the famed Blackall Range, the Atherton and Evelyn Scrubs, have long been celebrated for the vast supplies of the timbers mentioned, which they furnished and still continue to supply in abundance.

I have given this slight idea of the value of the scrub lands of the State, in order to show how the settlers in these districts were able, with very little capital, to speedily make comfortable homes for themselves, always provided that they were not afraid of hard work, were steady, and willing to forego, for a time, the attractions of city life and many of the luxuries which they deservedly enjoyed a few years later. In those early days the new settler, having decided on a suitable location, cleared a small portion of the land, and, with his family, lived in tents, until he was able to take the next step—the erection of a bark or slab hut. And this is where I propose to offer a few suggestions which are the outcome of personal, practical experience, the first six months of my farm life having been spent in a 6 by 8 feet tent, in which my mate and I lived in reasonable comfort.

The settler will naturally wish to be housed as soon as possible in something more substantial than a tent, especially if he has a family. The first and simplest and most quickly prepared material for a primitive house is bark; and of the few suitable barks for the purpose, stringy-bark is the best, boxbark comes next, and ironbark, which for the want of the two former was largely used in the early days of the Gympie goldfield by the miners, comes last. Tea-tree bark makes an excellent roof impervious to rain.

Unfortunately, trees furnishing useful building bark are not obtainable in the scrubs. They belong to the open forest, but most scrubs are adjacent to forest lands, and in new, not too closely settled, districts bark can be obtained without much difficulty. An hour or two with a bushman will be sufficient to show the settler how to strip the bark from the tree without injuring the sheet. The most wasteful method of bark-getting is to strip a sheet off the lower part of a standing tree, leaving possibly two or three sheets higher up. The better way is to fell the tree after laying down a couple of logs for it to fall upon so that it will not lie flat on the ground. There will then be no difficulty in taking off all the available bark.

HOW TO TAKE OFF A SHEET OF BARK.

The proper time to remove the bark is when the sap is well up. Suppose the tree to be standing. First, cut the bark through to the sap-wood, as in ringing a tree, at a height of, say, 2 feet from the ground. Then, if you have no rough bush ladder, cut a forked sapling, lean it against the tree, and, standing on the forks, cut round the tree at whatever

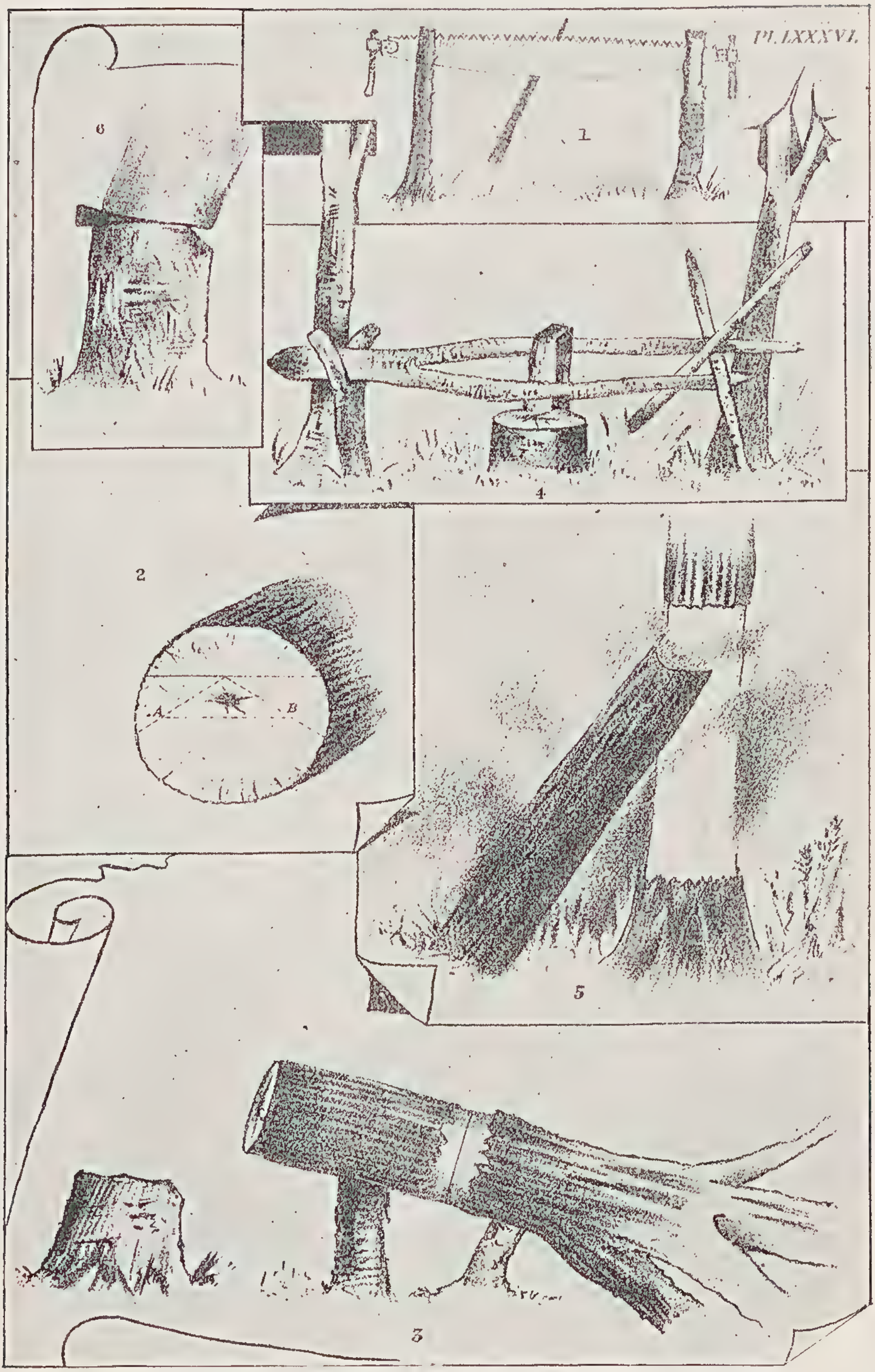


PLATE 2.—STRIPPING BARK AND SHINGLE-SPLITTING.

height you wish your sheet of mark to be—say 6 or 7 feet. Then make a perpendicular cut from top to bottom, connecting the upper and lower cuts. Be sure that the bark both above and below is quite cut through. If not, then, in taking it off, it will be almost sure to split when you reach the unsevered part. Now take a long sapling about as thick as a hoe handle and cut the small end to a wedge-shape, but only flatten one side. If both sides are flattened, there is danger of the pole piercing the bark and splitting it. The edge of the perpendicular cut may now be opened up flap-like with an axe or tomahawk to admit of the entrance of the pole, which is inserted between the bark and the wood, and moved from top to bottom, gently pushing at the same time. It will be well to have the assistance of another man at this stage of the work. As the bark is being quickly detached from the tree, it will require to be slightly held back to allow of working the pole, and when nearly detached the second man props it up behind, to prevent its suddenly springing off and falling on its back, when it is almost certain to split in two. He eases it gently to the ground, and leans it up against the tree. Then, in the case of stringy-bark, some of the thick outside woolly layer is stripped off, placed on the inside of the sheet, and set fire to. The green inside will not burn, but the heat steams it, and the water cells explode with little reports. When these cease, the sheet may be gently laid on its back on the ground, when it will open and lie quite flat without splitting. The remainder of the rough outside fibre is afterwards removed with a shovel, as it would retain moisture and retard the drying of the bark when piled in heaps. When a sufficient number of sheets have been obtained and laid on top of each other, the heap is loaded with a few logs, when they soon dry, remain perfectly flat, and become as hard as boards.

Should no help be available, then the stripper must place a widely-forked prop behind the sheet he is removing, and work very gently to the last. Should the bark stick to the tree at any point owing to the sap not being sufficiently up, a gentle pounding with the back of an axe will usually cause it to become detached. Some strippers light a fire round the tree before beginning the stripping. The above applies to taking off one sheet only from a standing tree.

We will now suppose the tree to have been felled, and to be lying clear of the ground on the logs prepared beforehand. A large tree, when falling will generally jump a foot or more clear of the stump, so that the logs must be so placed that each is clear of the intended length of the sheet. By this means the stripper is enabled to make his cut completely round the tree, the lower part sometimes necessitating the use of a saw to cut the bark clear of the log. The rest is easy. The circular and the horizontal (perpendicular in the standing tree) cuts being made, the sheet of bark is gently pushed off on both sides, withdrawn from under the tree, and treated as above.

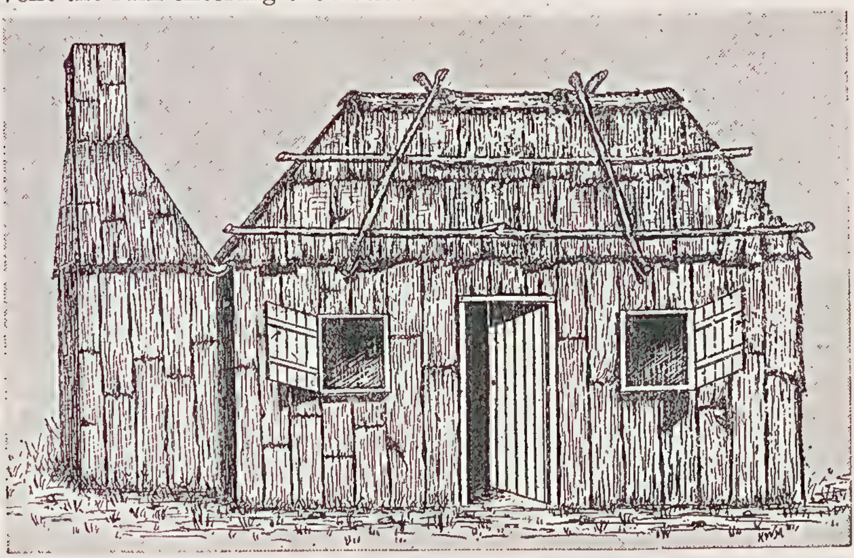
In the case of boxbark the burning is not so necessary, but a good steaming assists this rather brittle bark to lie flat without splitting. Iron-bark is more troublesome to prepare owing to the necessity for hewing off the mass of hard outside covering before removal from the tree. When stripped, this bark is thinner than either of the others mentioned, and is seldom obtainable without being more or less split. Two men can easily strip forty sheets of stringy-bark daily where the trees are numerous. Tea-tree bark requires no preparation. It is a silvery paper-bark,

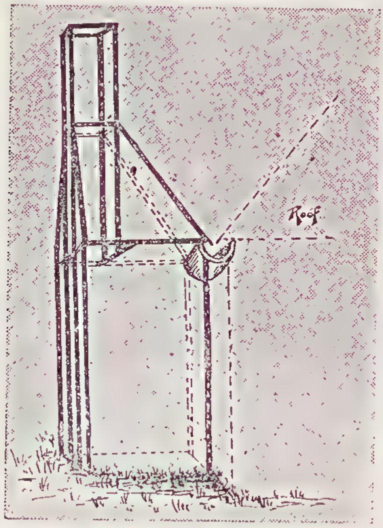
growing in layers which may be taken off in any thickness required, and is mainly used for roofing temporary bush humpies. It is laid over sapling rafters and battens, and secured by transverse battens laid over it. If properly laid, the heaviest rain will not pass through it. I lived for six months in a hut composed entirely of this paper bark, when timber-getting in the Brisbane River scrubs, and found it dry and warm. The tea-tree grows principally on wet land, and on the banks of rivers it attains a very large size.

BUILDING THE BARK HUT.

When the bark is fairly dry, it is ready for use. A few rough round posts sunk a couple of feet in the ground, with barked saplings for wall plates, rafters, and battens, form a quickly-erected frame work. The sides are first enclosed with the sheets of bark, leaving openings for a door and a couple of shutters (the luxury of glass windows is for the future buildings) being left. Nails in a bark structure are rarely used, as the heads draw through the bark unless backed with a square of leather, for which old boots come in handy. Strips of green hide are preferable to nails. Holes are bored through the bark, the green hide is secured to a wooden toggle on the bight, and the two ends are passed through the holes and tied firmly from inside to the sapling battens. Sides, roof, and gables are secured in the same manner. Two or three sheets bent over the ridge form the ridge-capping. To keep the roof in position, and to prevent any bulging or wrinkling of the bark covering, three heavy saplings are laid longitudinally on each side of the roof, which are held together by dog-legs pinned to them by wooden trenails, or the saplings may be slung by fencing wire across the ridge. Such a hut can be built in a day. It is watertight, warm, and airy. Most primitive settlers add a fireplace, built of the same materials, usually about 6 feet square. The interior arrangements need not be described. Many such first homes are floored with white-ant bed made into a sort of mortar with an admixture of cowdung. This makes a durable, clean floor.

The illustrations show the completed hut and the method of building the chimney when the hut has a hip roof. In that case the eave of the house roof and the eave of the chimney lead into a wooden trough to prevent the rain entering the house:—





In my next I shall explain the construction of the more permanent and more pretentious slab and shingle house.

THE FARMER'S SHEEP.

Mr. F. F. Nixon, Byabra Plains, writes us on this subject:—

"In the November number of the 'Agricultural Journal' you have an interesting article on 'Farmer's Sheep.'

"Some years ago I was breeding crossbred sheep on a run which I was managing on the Canterbury Plains, in New Zealand. I saw most of the crosses of English sheep on Merino ewes, and the most successful results were obtained from Lincolns. There is always a risk attending the use of Downs rams, and often heavy losses in lambing owing to the coarse broad heads of the rams, besides which the wool of the crossbreds is of low value. The type of Lincolns we used were Hiskham's and Essex, a narrow-headed sheep, with an even fleece of lustrous wool. My first drop of lambs—some 5,000—were shorn as hoggets, and gave 5 lb. of clean washed wool. All the fleece wool fetched 2s. 4½d. per lb. in London; the locks and pieces, of course, less. The wool, though clean, had plenty of yolk in it, five days being allowed between washing and shearing. These sheep had no artificial feeding at all, and there were plenty of fat lambs. In further crossing you can either use the Lincoln or Border Leicester ram; I prefer the former, as the lustre the Lincoln imparts produces an always saleable wool. In crossing rams it is essential to select lean-headed sheep, and even-woolled, not too coarse on the breech. I had to castrate an imported Lincoln ram for these two faults; owing to his big head, a lot of his ewes died lambing.

Poultry.

REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, NOVEMBER, 1912.

4,017 eggs were laid during the month. Mrs. Craig wins the monthly prize with 160 eggs. Had this pen been properly prepared before being sent here, we think they would have been in a much better position than they are. Broodies are becoming very troublesome, no less than 53 having been out to date, viz.—49 White Leghorns and 4 S.L. Wyandottes. The following are the individual records:—

Competitors.	Breed.	Nov.	Total.
R. Burns	Black Orpingtons ...	155	1,037
T. Fanning	White Leghorns ...	139	978
J. Gosley	Do.	126	957
A. T. Coomber	Do.	136	950
E. A. Smith	Do. (No. 2)	134	934
Range Poultry Farm	Do. (No. 1)	137	927
H. Tappenden	Do.	146	923
Yangarella Poultry Farm	Do.	137	908
J. R. Wilson	Do.	152	908
A. R. Wooley	Do.	113	895
Mrs. Beiber	Brown Leghorns ...	124	860
W. D. Bradburne, N.S.W.	White Leghorns ...	123	854
R. Burns	Silver-laced Wyandottes	127	850
E. A. Smith	White Leghorns (No. 1)	121	845
Mrs. Sprengel	Do.	157	838
Cowan Bros., N.S.W.	Do.	127	830
B. Holtorf	Do.	138	813
J. Zahl	Do. (No. 1)	120	784
Range Poultry Farm	Do. (No. 2)	139	766
A. H. Padman, S.A.	Do	132	765
J. Holmes	Do.	138	751
H. Hammill, N.S W.	Do. ...	127	746
J. Zahl	Do. (No. 2)	125	743
D. Grant	Do.	136	732
F. W. Cornish	Do.	145	708
W. W. Hay	Black Leghorns ...	126	700
Mrs. Craig	White Leghorns ...	160	681
Mrs. Dredge	Do.	118	678
R. Burns	Do.	145	677
J. F. Dalrymple, N.S.W.	Do.	114	647
Totals	...	4,017	24,685

Pastoral.

THE "TANDAWANNA" SHEEP DIP.

By W. G. BROWN, Sheep and Wool Expert.

In the course of my duties during the past twelve months, I have seen more lice and tick-infected sheep on the Downs than I believed possible, when so much advice on the advantages of dipping sheep has poured from the Press, from wool-brokers, and from practical sheepmen all over the States.

I found that on every well-managed holding the dip was considered an essential part of the working plant, but in the case of smaller holders a large number had no dip, and, among the few who possessed one, carelessness in its use was common. At the risk, therefore, of seeming tedious I propose to show again the certain advantage of dipping in a proper manner, and further describe a method which eliminates any disadvantages of the process as it is too often conducted.

Stated shortly, the advantages of dipping are:—

1st. The destruction of ticks, lice, and other vermin which sheep on the Downs or coastal districts are so liable to carry. Ticks are easily noticed, but lice may exist on sheep without the owner being aware of the fact, for the insects are of the same colour as yolk, and very minute. These set up an irritation which causes the animal to rub against fence posts, stumps, and logs. One consequence is a badly-grown, felted, and ragged, and generally inferior fleece.

2nd. The worry causes a falling-off in condition. A ticky or lousy ewe, owing to her condition, breeds a less robust lamb than if she were comfortable. The lamb itself becomes badly infested, and, if not dipped, will probably die of poverty.

3rd. If dipping does not altogether prevent the attack of the maggot-fly, it certainly acts in no small measure against that pest. That fact, from evidence which I have at command, is undoubted, and, for that reason alone, all sheep-owners should be compelled by law to dip their sheep, as they are in Victoria and Tasmania. Once a man dips his sheep, he will not require to be compelled, the benefits being so apparent.

Summed up, therefore, the effects of dipping are—

1. A better and more valuable fleece.
2. A more contented and, therefore, better "doing" sheep.
3. A better and more robust lamb.
4. A fairly large degree of immunity from the attack of the maggot-fly.

The disadvantages of dipping are—

Initial cost of dip and expense of working it.

Liability of injury to sheep, caused by rough usage, which is nearly unavoidable in ill-constructed dips.

The liability to serious loss after dipping by sudden falls in temperature or other changes of weather.

The liability of the animals swallowing a large quantity of the liquid in the bath, which, if it do not kill, will certainly make very sick sheep.

The direct benefits of an increased price for a heavier fleece more than balance the cost of the operation. A sheep may be dipped for three-farthings or less, and at least one penny per pound will be added to the value of its fleece.

As to liability of injury, I shall show below that a new method of dipping has been invented which eliminates all the sources of rough usage, and, further, makes it impossible for a sheep to be poisoned or drowned.

Care in choosing suitable weather will prevent the losses caused by sudden changes of temperature. A sheep should be dipped as early as possible in the day, so that it may have its wool dry before night.

The above short *résumé* of the principal effects of dipping sheep are given *apropos* of a method of operation which is radically different to the old plunge bath, and superior to it in every way.

I met Mr. George Watson, of Tandawanna, some weeks ago, and he told me that for three years he had tried a new and superior method of dipping his sheep. He invited me to inspect his operations, and, a little later, telegraphed me that he was about to dip about 40,000 sheep and invited me to Tandawanna. What I saw I shall describe for the benefit of all sheep-men. I believe the method to be the best and most satisfactory in all respects of any.

He informed me that he got the original idea from Mr. Charles Keane, of Gurley, New South Wales, but that he has improved on it in many respects since he first used it three years ago. I give below all particulars.

The idea may be described as a shower bath instead of a plunge, and the essentials are a flat tray roof perforated with holes under which sheep stand quietly while the liquid used is showered upon them. The complete specifications of Mr. Watson's dip are as follow:—

The shed is 40 feet long by 12 feet 6 inches wide. The roof is flat and covered with No. 22 gauge, flat galvanised iron, soldered at all seams, and perforated with No. 10 holes 3 inches apart. The iron is turned up all around the edge about 6 inches. Thus the roof is really a big iron tray.

Roof joists are 6 inches by 2 inches, and placed 18 inches apart, and run across the building. The height of the shower is about 6 feet above the floor. The floor is of corrugated galvanised iron, No. 22 gauge, and

not battened. The sheep have not injured it in any way in three years' working. The floor is laid with a fall to the side of 2 inches in 10 feet across the shed. The channels of the corrugation lead into a gutter, which carries the liquor draining off the sheep back into the dip tank where the dip liquor is mixed. The dip tank is an excavation 8 feet by 4 feet by 4 feet, lined with flat galvanised iron and made watertight. From this tank a 3-inch centrifugal pump, worked from a 3½-b.h.p. oil-engine, delivers the dip mixture on to the tray roof of the shed, and this falls in a gentle penetrating shower on the sheep standing beneath. A pair of gates at each end of the shed hold the sheep.

In practice, when the entrance gates are opened, the sheep march straight through to the far end of the shed without the least trouble. Such a thing as "dip-shyness" is not seen, and they are thoroughly wetted all over in six or seven minutes. I inspected a number of animals, and found that the dip was all over the body in every case. Three or four minutes suffice to drain them; thus a shedful of sheep may be dipped every fifteen minutes, allowing for filling and emptying. The capacity of the Tandawanna shed is from 250 to 300 sheep. One thousand sheep per hour can be dipped without undue haste by four men.

An excellent feature of the shower-dip is its extreme simplicity and small cost of construction. It may be built to work flocks of hundreds of thousands, or small flocks of 1,000 or under. For the small holding a shed which will wet forty or fifty sheep at a time should not cost more than £10, and a cheap 2-inch Douglas hand pump would be quite effective. Better still, a No. 8 semi-rotary pump could be used, and should give excellent results. This pattern of dip is as good for the small holder as the great.

DRAININGS.

Mr. Watson informs me that the sheep should be packed in pretty tightly. They cannot then hump their backs, and so prevent the dip getting under them as soon as it ought. After the sheep have drained four or five minutes the surface of the dip tank should be skimmed with a hand skimmer. This will keep the solution fairly clean. A minor source of trouble is the presence of short fribs of wool, which find their way into the dip tank, and from there into the shower. These fribs get into the perforations, but are easily removed by a boy using a broom over the surface of the tray.

I have gone into this matter at some length, as I consider that there is no other way to dip sheep that approaches the Tandawanna shower-dip. Mr. Watson should receive the thanks of every sheep-master in the Commonwealth for elaborating a simple, cheap, safe, and effective method of dipping sheep. He informs me that the cost works out for dipping at about ½d. per head.

I shall be pleased to answer any questions on the subject, and give any details which I may have missed above.

Dairying.

THE BY-PRODUCTS OF WHEY.

[Paper read before the Members of the Cheese Manufacturers' Association, at their Annual Conference, held in Pittsworth, on 24th July, 1912, by E. GRAHAM, Dairy Expert.]

The whey discarded from cheese factories contains commodities that are recoverable and of commercial value, but up to the present we have made no effort to extract these by-products from the whey, or turn them into profit, other than as food for calves and swine.

However, with the greater activity manifest in cheese production, it is no longer economical for our larger factories to permit the whey to carry its full complement of butter fat and lactose into the whey tank.

Ordinarily, whey contains butter fat, lactose, and albumen, and it is to the two first-named substances that I wish particularly to refer, and show the possibilities of their utilisation, and the processes whereby their recovery from the whey may be effected.

I will first deal with the butter fat of whey.

The fat in whey can be readily removed in fairly full degree by means of an ordinary centrifugal separator, and the resultant cream can be made into butter in much the same manner as cream separated directly from milk.

The butter produced from a whey source is usually softer than in the case of normal butter, but the flavour, when the processes of manufacture are intelligently carried out, is fair to good, although lacking the nutty flavour characteristic of really fine butter made directly from cream.

The average loss of butter fat in the whey in Cheddar cheese-making may be accepted as varying from 0·20 to 0·55, while an average loss of 0·25 lb. (4 oz.) of fat in 100 lb. of milk indicates excellent work under factory conditions.

It is probably safe to assume that the whey from our cheese factories contains an average from 0·30 to 0·50 per cent. of butter fat, but even the whole of this small amount of butter fat cannot be made available for butter-making purposes, as the amount of the fat content is necessarily reduced by the quantity lost in the process of separation.

The loss of butter fat in the skimming of whey may be set down at ·05 to ·10 per cent.; therefore, from the whey produced in making 1,000 gallons or 10,000 lb. of milk into cheese under average factory conditions, about 30 to 35 lb. of whey butter can be made.

The question of making whey butter is largely a matter of cost of production. In the case of small cheese factories, the yield of butter will not repay the labour. With larger factories the chief consideration would be the percentage of butter fat the whey contains.

In general, it may be said that the manufacture of whey butter will usually be profitable under the following conditions:—

(*a*) When the average daily supply is not less than 10,000 lb., or 1,000 gallons of milk, and the amount of fat recoverable from the whey averages 0·25 lb. of fat or more to every 100 lb. of milk received at the factory.

(*b*) When the average cost of making whey butter can be kept sufficiently low.

(*c*) When gravitation can be used and the whey carried from the vat to the separator at a minimum cost.

It is obvious that no great profits may be derived from the extraction of butter fat from whey, especially if all the necessary plant and accessories have to be installed solely for that identical purpose.

The plant necessary to carry out the manufacture of whey butter would be very similar to that used for the manufacture of butter from the cream of milk, the chief difference being that, if a good quality of butter is aimed at, pasteurisation of the whey cream and the use of a sound lactic "starter" would be imperative.

Fortunately, there are a fair number of cheese manufacturing companies that have factories so situated as to make it possible for them to unite and mutually decide upon some means whereby all the whey cream could be sent to a common centre for conversion into butter by an established butter manufacturing company, and so save the expense of the installation of an independent manufacturing plant at each cheese factory, leaving the installation of the separator as the chief item of cost.

So much for the possibilities of butter-making from the fat that escapes in the whey of the milk used for the purpose of making Cheddar cheese. But, before concluding, I would like to remind the members of the Cheese Manufacturers' Association that butter fat is not the only milk-solid of value contained in whey which has so far not been turned to its full commercial use in this State.

In addition to butter fat, whey contains milk sugar, or lactose, which is a commodity of considerable commercial value. In comparison with butter fat, a distinct advantage rests in favour of milk sugar insomuch that milk sugar is found in whey in much greater abundance than is butter fat. It is claimed that whey, as it leaves the cheese vat, contains from 3½ to 4½ per cent. of lactose, while the recoverable amount of butter fat is less than one-tenth of this amount. In other words, the quantity of average whey necessary for the production of 4 lb. of butter would furnish more than 40 lb. of lactose. An approximation of the relative commercial values of these two by-products is as follows:—

Whey butter has a marketable value of 8d. to 9d. per lb.

Lactose has a marketable value of 6d. per lb.

Taking these prices into consideration, together with the ratio of the percentages in which the commodities are present in whey, and applying the full relationship to 1,000 gallons or 10,000 lb. of whey, it is found that the following figures are revealed:—

10,000 lb. of whey would yield approximately 36 lb. of butter = £1 7s.

10,000 lb. of whey would yield approximately 400 lb. lactose = £10.

These figures show the comparative importance of lactose as a by-product of whey, and should be sufficient to encourage cheese manufacturers to give the extraction of lactose from whey their most serious consideration.

It would appear that the utilisation of both the butter and the lactose contained in whey are propositions that may be undertaken conjointly and made to go hand in hand; the reason being that the reduction in the butter-fat content of the whey, by the primary process of separation carried out in connection with the manufacture of whey butter, is the first step towards preparing the whey for the subsequent processes to be followed in the extraction of milk sugar. Of the procedure to be followed in the extraction of milk sugar from whey, I can give the outlines:—

> The raw material used in the manufacture of milk sugar is whey. The whey free from curd is evaporated until the sugar crystallises out. To purify it, it is redissolved, filtered through animal charcoal, and recrystallised. A process, similar to that frequently used in the manufacture of beet sugar, is often applied to the manufacture of milk sugar. The whey is boiled out with milk of lime, saturated, and filtered.

There are also several patented processes by which the work may be accomplished. It would be a comparatively easy and inexpensive process for the cheese manufacturers to carry out the extraction of milk sugar from whey up to the first point of crystallisation; and I am indirectly informed that a company have under consideration the matter of the refining of milk sugar, and, if the proposal materialises, factories could forward the crude crystallised lactose to the refinery and have the final process of manufacture there completed, and so escape the cost of the installation of the refining plant. The recovery of lactose and butter fat from whey would leave the albumen in whey as the only constituent of commercial value, and no doubt the recovery of the albumen could be undertaken concurrently with the extraction of the other two milk solids found in whey. Albumen is of commercial value, but is contained in whey in only limited quaitities, and is represented as from ·5 to 1 per cent.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

RECORD OF COWS FOR MONTH OF NOVEMBER, 1912.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Test.	Commercial Butter.	Remarks.
			Lb.	%	Lb.	
Glen ...	Shorthorn... ...	5 Sept., 1912	892	5·4	53·94	
Rosalie ...	Ayrshire	5 Aug. ,,	981	4·0	43·84	
Auntie ...	,, ...	4 July ,,	890	4·3	42·92	
Lady Lock...	,, ...	10 July ,,	870	4·2	40·93	
Miss Edition	Jersey	13 Aug. ,,	830	4·4	40·02	
Reamy ...	Ayrshire	9 Aug. ,,	877	3·9	38·16	
Bliss ...	Jersey	22 Aug. ,,	627	5·1	36·13	
Silver Nell...	Shorthorn... ...	29 Oct. ,,	891	3·6	36·04	
Bluebelle ...	Jersey	2 Aug. ,,	688	5·0	35·78	
Gem ...	Shorthorn... ...	29 April ,,	648	4·0	28·95	
Lady May ...	Ayrshire	19 July ,,	541	4·7	28·63	
Mist ...	Holstein	20 Oct. ,,	619	4·0	27·66	
Nellie II. ...	Shorthorn... ...	29 Aug. ,,	607	4·0	27·13	
Lady Margaret	Ayrshire	4 May ,,	603	3·9	26·28	
Burton's Lily	Shorthorn... ...	5 Oct. ,,	620	3·8	26·25	
Burton's Lady	,, ...	1 June ,,	579	3·9	25·19	
Miss Heydon	,, ...	21 Mar. ,,	578	3·9	25·14	
Dewdrop ...	Holstein	30 Nov., 1910	554	4·0	24·75	
Lady Morton	Shorthorn... ...	9 Feb., 1912	529	3·8	22·39	
Honeycombe	,, ...	29 Aug., 1911	455	4·3	21·94	

THE INDIAN RUNNER DUCK.

Very little is heard in this State of this valuable breed of ducks, although inquiries concerning breeders frequently reach us.

The Indian Runner is of a different type altogether from any of the other breeds of ducks, though nearest in character to the Pekin. Its chief merit is its enormous laying capacity, and it naturally follows that its table qualities are of secondary value, but this is more on account of the smallness of its size than from its lack of flavour, especially at a tender age. Its most marked feature, apart from colour, is its erect penguin-like carriage, its long thin neck, and finely-drawn flat head with the eye situated near the top. The legs are set far back, and the bird is very alert and racy-looking. The plumage is hard and close. The markings are very distinct from those of any other breed. There are two colours, the fawn and the grey; but the former is the original colour, as in the first imported stock from India, and it is the more popular.

The birds are great foragers, wander very far afield, and have a trick of laying away from home. It is, therefore, best to keep them confined till they have contributed their share to the egg-basket. The standard weight of the bird is only 4 to 4½ lb. It would be a great mistake to endeavour to increase the weight of Indian Runners. The Leghorns suffered greatly as layers from this cause. The small duck and the large and plentiful egg should be preserved.

In judging, colour takes first place, and symmetry and carriage next; and these are the two points to look for in mating, especially the good colour in the drake. The *marking* of the head and neck counts 20 points and the body markings 25.—" Sturges' Poultry Manual."

State Farms.

WEEDS ON SCRUB CLEARINGS.

BY D. MACPHERSON, Manager, State Farm, Kairi.

One of the first propositions that confront a settler, after felling and burning off a clearing, is *weeds,* and I have had various inquiries as to the easiest way of dealing with them. Most of these inquiries, however, come from people who, from one cause and another, have already allowed their clearings to get into such a condition that nothing short of hard work and time will clean them.

The question of weeds is undoubtedly one of the many cases where "prevention is better than cure," and particularly is this so with ink weed, the most dreaded weed on a new clearing.

The first clearing, on this Farm, was separated by about half a mile of new scrub from the nearest ink-weed patch, and for that reason was not so thickly sown with the pest as it might have been; but ink weed in considerable quantity made its appearance after the first rain, and, if it had been allowed to have its own way, would have soon turned the clearing into an impenetrable thicket. As it was, I allowed it to stand till the bushes were easily distinguishable among the corn stover, and then put men on to cut it out. The cost of the first weeding, which included taking out many other weeds than ink weed, worked out at 9s. per acre, and this included clearing the couch and pig weed from an area that is intended for immediate cultivation, and was therefore not grassed. Since the first weeding, which was done before the ink weed seeded, I have had no trouble with that weed on the first clearing.

I anticipate reaping a further benefit from keeping the weed in check in an adjoining clearing, which is even further from outside ink-weed patches, and will not have been seeded from our own clearing.

On the other hand, a third clearing, which adjoins a neighbour's ink weed-infested paddock, is already showing young ink weed very badly. This neighbour's paddock was a home for birds which, having gorged themselves on the fruit of the ink weed, flew into the trees on the edge of our scrub and deposited the seed there at their leisure. I anticipate that this clearing will, for this reason, give me more trouble than the other two, but I am satisfied that, both directly and indirectly, it will pay best to fight this pest the first year—directly, because it will save money in the future for weeding that clearing; and indirectly, because it will affect the amount of ink-weed seed dropped by birds in the standing scrub adjoining, which will have, at some no very distant date, to be felled and cleaned of weeds.

Probably the best tool to tackle ink weed with is a brush knife with the end squared and sharped, so that it will cut on the thrust stroke as well as the slash. This enables the user to reach ink weed growing

under logs or among branches, where the ordinary swinging stroke is impracticable. To do any permanent good, the plant must be cut below the surface of the ground.

To my mind, the stinging tree is an even more formidable pest than the ink weed. Fortunately, however, this plant likes the edges of the clearings best, and, also, fortunately, it is easily killed with the spray pump and a solution of arsenic. This is the more fortunate, as to tackle stinging tree with a hoe or knife is one of the most unpleasant jobs imaginable.

The growing sappy ink weed also yields readily to the spray pump and arsenic; but, under ordinary conditions, it is not economically practicable to carry the necessary amount of liquid over a new clearing. A suggestion, however, is made to those who have badly-infested clearings—that if they would brush down the ink weed, and then, when it begins to shoot, go over it with a spray pump, good results would follow. There would, however, still be the seed in the ground to resow the place, showing the truth of the old proverb that "One year's seeding makes seven years' weeding."

MORE ABOUT OATS IN CENTRAL QUEENSLAND.

By T. JONES, Manager, State Farm, Warren.

Some time during June, 1912, the Rockhampton Chamber of Commerce received some very choice samples of seed oats from the Director of Agriculture, Tasmania. It was decided to ask me to give the seeds a trial at this farm. This I did, with the following results:—

The varieties were—

Giant Oats	A and B Grades.
Tartarian	A and B Grades.
Stout White	A and B Grades.
Algerian	A and B Grades.

The seeds were planted on the 20th July in a properly prepared bed, and, as the ground was moist and the seeds being good, germination was splendid. At the commencement of growth, the A Grades took the lead, owing to the germ in that grade being stronger.

When about 1 foot high, the Giant Oats showed to advantage, with the Stout White a close second, Tartarian third, and Algerian a bad last. When coming out into head, the Tartarian showed to advantage, with the Giant and Stout White about even.

At this stage rust attacked them all, the Algerian being freer from its effects than its companions, and was the only variety that developed grain.

The plots were cut on 5th December. The rainfall during growth was 460 points. Although climatic conditions were favourable to growth during the time these crops were growing, they made poor growth.

The result of the experiment would have been disappointing had it not been proved to be the usual result with oats in this locality.

The Orchard.

EXTRACTION OF OILS FROM CITRUS FRUITS.

Every year in all orchards from various causes a certain amount of fruit of different kinds is not readily marketable. This, of course, is a dead loss to the fruit-grower unless he has some means of utilising the product, either as pig food or, in the case of apples, cider-making. The skin of citrus fruits, such as oranges, lemons, limes, cumquats, shaddocks and "poor man's orange," contains a large amount of essential oil, which is a product always in demand for manufacturing purposes. It is by the extraction of this oil that a profit can be made out of waste citrus fruits, if it can only be done economically. From information that we have received, it would seem that the means of extracting the oil is now available in the shape of a simple machine which can be worked either by hand or by power invented by Messrs. Allport and Davenport, two practical West Indian planters, long resident in one of the most important citrus centres in the West Indies. The sole rights to the invention have been secured by Ecuelles Limited, Chancery lane, London, W.C., from whom catalogues and price lists can be obtained. The machines are designed solely for the extraction of "hand-pressed" citrus oils (otto). They are not in any way connected or associated with any system for the production of distilled oils.

The essential features of the machines are:—A travelling pressing device, and a stationary puncturing device, so arranged that the fruit is rolled along between these two devices, the cells in the outer skin of the fruit being punctured and pressed, so as to expel the oil they contain, and the oil so extracted is collected by another device for that purpose. The whole machine is so adjusted as to provide for variations in the size and shape of the fruits, in the texture of their skin, and in their different behaviour under the action of external pressure, and also to protect the oil when extracted against volatilisation, admixture with foreign substances, emulsion, or neutralisation.

All the parts of the machines which come in contact with the oil or the fruit are constructed either of brass, copper, or wood.

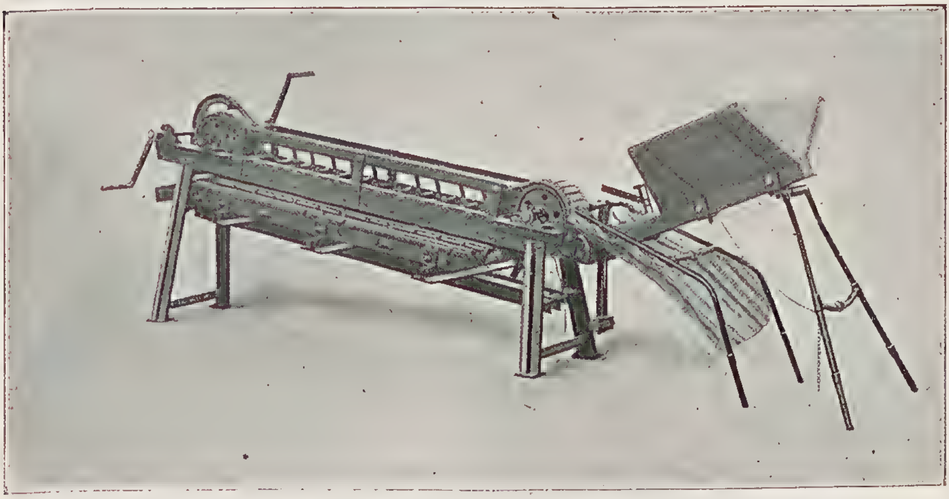
These machines only deal with the outer rind of the fruit, and do not affect the pulp in any way, so that limes and lemons from which the oil has been extracted are just as suitable for the manufacture of limejuice and citrate of lime, &c., and oranges for the manufacture of marmalade or wine.

Under the previous "Ecuelle-pan" method, the oil recovery industry was only profitable in "black labour" countries, and even there the cost amounted to at least 30 per cent. of the gross value of the product, whereas the mean cost of extracting the oil by means of the Ecucelling machine is stated to average from 1 to 8 per cent., according to the

variety and condition of the fruit. This implies that by it, orange-growers who have unmarketable produce, will find the extraction of the oil a remunerative business. Under fair conditions the yield from these machines should be: For limes, $\frac{1}{2}$ oz. to 1 oz. or more per bushel; for oranges and lemons, 2 oz. to 3 oz. or more per bushel, according to the condition of the fruit; but under average circumstances, $\frac{2}{3}$ oz. per bushel of limes, and 3 oz. per bushel of oranges may be, it is said, confidently expected.

The machines are made in three sizes:—

The Small Machine, with simple gravity feeder for hand power only, making thirty to forty revolutions per minute. This is recommended for small lime-growers, but not for oranges or lemons, except in the case



Showing one of the Twin Ecuelle Grates ready for Cleaning.

Reverse Side showing the other Twin Ecuelle Grate in position for Use.

PLATE 3.—INTERMEDIATE MACHINE (NO. 2A), WITH STANDARD GRAVITY FEEDER FOR HAND OR POWER.

of very small orchards. This machine is capable of treating about 30 to 35 bushels of fruit per hour.

The Intermediate Machine A, with standard gravity feeder for hand or power, makes forty revolutions per minute. It is specially recommended by the proprietors for limes, lemons, and oranges, and will treat from 50 to 60 bushels of fruit per hour. Oranges and lemons should be put through the machine twice.

The Intermediate B, with standard force feeder, is for power only, and is only suitable for limes of which, making sixty to seventy revolutions per minute, it is capable of treating 90 to 100 bushels of limes per hour.

The Largest Machines A, for oranges and lemons only, for hand or power, make forty revolutions per minute, and can treat about 180 bushels per hour. The Large B machine for limes, driven by power only, makes sixty to seventy revolutions per minute, and is capable of treating about 180 bushels of limes per hour.

A SEEDLESS POMELO.

"One of the most important recent introductions of the Bureau of Agriculture," says the "Philippine Agricultural Review," "is that of the Siamese seedless pomelo, obtained from Bangkok, Siam. Nearly everyone engaged in raising citrus fruit throughout the world has heard of this wonderful citrus fruit in Siam, and several attempts have been made heretofore to introduce it into other countries. However, largely on account of the inaccessibility of the district in which this particular variety exists, all efforts, so far as we know, with the present exception, have failed. The writer examined this famous fruit in April, 1912, and was satisfied that both in appearance and flavour, the specimens were fully up to the high mark set by previous descriptions. This variety is probably the most free from seeds of any of the pomelos, or so-called 'grape fruits,' which are, of course, only varieties of pomelos."

They are also called "shaddocks," the grape fruit being a thin-skinned variety having a diameter of from 4 to 4 ½in., while some of the larger pomelos are as much as from 9 to 10 in. in diameter. The writer in the "Review" received some bud sticks of the Siamese pomelo from Bangkok. Owing to faulty packing and subsequent rainy weather, half the buds, which were inserted on arrival, died, but a few survived, and two had started growing, thus making the introduction a success.

"It is," he says, "difficult to estimate the value of this fruit to the Philippines, but if the industry develops there, as is hoped it will, there is no question about this pomelo taking the first rank in that group of citrus fruits."

As far as Queensland is concerned, the taste for pomelos has not yet been developed, and there is very little market for them. Neither does it appear that our citrus-growers have any knowledge of the seedless Siamese pomelo.

CULTIVATION AND MANURING OF ORCHARDS.

By J. C. BRÜNNICH, Chemist to the Department of Agriculture and Stock.

The old idea that orchards can continue to bear heavy marketable crops for years without proper cultivation and manuring is fortunately losing ground; but it still exists, and it will therefore not be out of place to draw attention to the **importance of thorough cultivation** and **judicious application of manures** on the profitable management of orchards.

A fruit tree, just like any other plant, requires, beside **moisture, sunlight,** and **heat,** other substances, generally classed as **plant foods,** which are assimilated with the aid of its leaves and roots, and utilised during the growth of the tree and production of the fruit.

The principal plant foods are: **Carbon, Oxygen, Hydrogen,** utilised in the form of carbonic acid gas and water; and **Nitrogen, Sulphur, Phosphorus, Potassium, Sodium, Calcium** (lime), **Magnesium,** and **Iron.** All these substances must be available to the tree, and even some others, like Chlorine, Silica, Manganese, &c., although used only in extremely small quantities, appear also indispensable, and frequently the want of one or the other may lead to a failure of the crop.

A **proper care** of fruit trees aims at the preservation of the fertility of the soil of the orchard, and at a regular supply of all the necessary plant foods, with a careful conservation of moisture.

The **great demand** made by fruit trees **on the soil** is hardly sufficiently understood, and few will credit the fact that the average crop of fruit from an acre of apple trees removes considerably more plant foods from the soil than a crop of wheat continuously grown for the same period. Various fruits, moreover, make different demands on the soil, a crop of **cherries,** for instance, robs the soil of about **double the amount** of **mineral plant foods** than does a crop of apples or pears, and for that reason alone, cherry trees require a much richer soil.

A proper consideration of these points "leads one to wonder not why old orchards are failing, but why they have not ceased to produce merchantable fruit long ago." (Prof. I. P. Roberts.)

The choice of a site for an orchard, the class of fruit to grow in each locality, the preparation and cultivation of the land prior to planting, falls beyond the scope of this pamphlet, and requires special treatment by the instructor in fruit culture. Of course, this **original preparation** of any orchard will be of the greatest importance to any subsequent treatment, and, in many cases, want of care in the choosing of the soil, site, locality, followed by years of neglect and want of care, may make later cultivation and application of manures, made with a view to renovate the orchard, quite unprofitable.

The objects of these notes are simply to give the treatment of the soil of an orchard by cultivation and manuring, and the reasons for doing so, and as a text, I could do no better than quote the abridgement and summary of Prof. L. H. Bailey's excellent bulletins, published by the Cornell University Agricultural Experiment Station: "**The Cultivation of Orchards**" (Bull. 74) and "**Care of Fruit Trees**" (Bull. 102), as follows:—

"If orchards are to be made profitable, they must receive as **good care** as other crops.

Good drainage, natural or artificial, is essential to success. Trees are impatient of wet feet.

Well drained lands are **drier** in wet spells and **moister** in dry spells than other lands. They can be worked earlier in spring.

Good tillage increases the available food supply of the soil and also conserves its moisture.

Trees should be made to send their roots deep into the soil, in order to fortify themselves against drought. This is done by draining the soil and by ploughing the orchard rather deep.

This **deep ploughing** should begin the very year the trees are set and it should be continued every spring until the habit of the trees is established.

Moisture is retained in the upper soil by very frequent, but shallow, tillage, by means of which the surface of the land becomes a mulch for the soil beneath.

Tillage should be begun just as soon as the ground is dry enough in spring. This tillage should be repeated as often as once in ten days throughout the growing season, which extends from spring until July or August.

Tillage should not exist for the purpose of **killing weeds.** Weeds have taught the most important lesson in agriculture, to be sure, but the schoolmaster should now be able to retire.

Late cultivation may be injurious by inducing a late growth, At all events it can be of small utility when the tree begins to mature and rains become frequent. This season of respite gives the grower the opportunity of raising a green manure, and of adding fertility to his land at trifling expense and with no harm to his trees.

Fall ploughing may be advisable for farm crops, but it should generally be discouraged in orchards. The land in orchards should be left compact in the fall, and it is advisable to cover it with some close herbage.

Only cultivated crops should be allowed in orchards early in the season. Grain and hay should never be grown.

Nursery stock should not be grown in orchards.

Even hoed or cultivated crops may rob the trees of moisture and fertility if they are allowed to stand above the tree roots.

Cultivators is the best crop to raise in an orchard.

Sod is sometimes allowable in apple and standard pear orchards, but never in other fruit plantations; but even it should be pastured closely with sheep or hogs. If the stock is fed at the same time, the land will fare better.

Watch a sod orchard. It will begin to fail before you know it.

Probably nine-tenths of the apple orchards of New York State are in sod, and many of them are meadows. Of course they are failing.

The remedy for these apple failures is to cut down many of the orchards. For the remainder, the treatment is cultivation, fertilizing, spraying—the trinity of orthodox apple-growing.

In general, **level culture** is best. The modern cultivators and harrows make such cultivation easy.

Trees, especially apples, are often trained too high, because of the difficulty of working close to them. Modern tools will bring the heads within reach.

Harnesses with no projecting hames nor metal turrets should be used in bearing orchards. Those requiring no whiffle trees are also useful.

Potash is the chief fertiliser to be applied to fruit trees, particularly after they come into bearing. Potash may be had in wood ashes, muriate and sulphate of potash. It is most commonly used in the latter form. An annual application of potash should be made upon bearing orchards. Of the sulphate from 500 to 700 lb. may be used to the acre in mature orchards.

Phosphoric acid is the second important fertiliser to be applied artificially to orchards. It may be got as plain high-grade superphosphate (dissolved South Carolina rock), in the bone fertilisers, and perhaps in Thomas slag. Of the plain superphosphates, from 300 to 500 lb. may be applied to the acre.

Nitrogen can be obtained cheapest by means of thorough tillage (to promote nitrification) and nitrogenous green manures. There is rarely occasion for buying it for fruit plantations, if the lands are properly tilled and cropped.

Nitrogen promotes growth. It should therefore be used with some caution, for orchard trees should be grown for fruit rather than for timber.

Barn manures are generally more economically used when applied to farm crops than when applied to orchards ; yet they can be used with good results, particularly when rejuvenating old orchards.

In general, the commercial complete fertilisers are less rational for orchards than a fertiliser made for the occasion out of materials evidently needed by the trees ; but the complete fertilisers give much better results than the prevailing indifference and neglect.

Cultivation may be stopped late in the season, and a crop can then be sown upon the land. This crop may serve as a cover or protection to the soil and as a green manure.

A **green manure** improves the soil by adding fibre to it and by increasing its fertility. It catches the nitrates which, earlier in the season, are used by the tree roots. Vegetable fibre in the soil increases its power of holding both moistures and plant foods.

The crops well adapted to this late sowing are few. Vetch is probably the best which has been well tested in the State. But everything points to crimson clover as the ideal cover and green manure.

The gist of it all is that **orchards should be cultivated and fed.** Cultivation should begin **early** and be **continued often.** It may be stopped in August if the grower thinks best, and then, if the land needs it, a green crop may be sown for turning under the next spring.

CARE OF FRUIT TREES.

A. **Sod-treatment** of an orchard is a revival of the time when orchards were mere incidental accessories to the farm, and when the destiny of the apple was the cider barrel.

B. No one **cause** can be assigned for all the **failures of orchards** to bear. The cause may be different for each orchard, and its determination, therefore, is a local question in each instance. The experimenter can discover the various agencies which may make orchards to be unproductive, but he may not be able to ascertain which one, or which combination of them, may affect any given orchard.

C. The orchardist is to discover the causes of his failures, first, by acquiring a knowledge of the fundamental requirements of fruit trees, and, second, by carefully watching and studying and experimenting with his own plantation.

D. Some of the leading agencies or errors which lie at the bottom of the unproductiveness of orchards are as follows :—

(a) The **plantation** lacks **plan** and **forethought**.

(b) The **land** is often **unsuited** to the purpose, particularly in respect to its aspect, drainage, and general physical make-up.

(c) **Neglect** of **tillage** or **cultivation** is probably the most universal fault. This tillage should begin early in the season ; it should be stopped in late summer or early fall ; it should begin when the orchard is planted and should be applied to the entire surface ; and it should be performed in such manner as to keep the land in fine and uniform tilth.

(d) **Lack of plant food** is probably a common cause for failure.

(e) Good treatment may be begun too late, after the habit of the trees has become too thoroughly established to be readily broken.

(f) It is a common effort to **raise annual crops** in bearing orchards and to allow the **trees only the skim milk.**

(g) **Pruning** is often neglected.

(h) **Insects** and **fungi** may hold a mortgage on the crop.

(i) **Poor** or **ill-sorted varieties** render many orchards unprofitable.

(j) Trees may be expected to be unproductive if they are propagated from unproductive trees.

WEEDS.

Weeds are feared by those farmers who have made some mistake in the management of their fields, by virtue of which the weeds have found a chance to prosper.

Weeds, therefore, may be said to have a mission—first, to educate the farmer, and second, to ameliorate the soil.

Good and judicious tillage and cropping are the only effective means of keeping down weeds. A foul place can be cleaned by inaugurating, for a time, a short and vigorous rotation of crops.

The Russian thistle, which is now so much dreaded, may be depended upon to still further improve the practice of farming. If it spreads seriously, it will be because our scheme of farming allows it to spread by not keeping the land in full use ; it must, therefore, be checked by more intensive and careful farming, and this will be a distinct reform."

I will now proceed to discuss some of the most important rules quoted above.

Drainage. It is of the greatest importance that the soil of an orchard possesses perfect drainage ; and, for this reason, soils with a heavy clayey subsoil are rarely suitable for fruit culture. **Loose well-drained soils** absorb and retain **moisture** much better than undrained soils. Drained soils are always **warmer**, are easier to cultivate, and allow an **early cultivation** even after heavy rains. Badly drained soils are generally sour, cold, and badly aerated. The **aeration** or the entering of air into a soil is of greatest importance, as it promotes **bacterial activity**, and liberation of plant foods. Drainage induces the development of a good root system, the roots are sent deeper into the ground, and trees are, therefore, better enabled to stand droughty conditions.

The superiority of the granitic soils of the Stanthorpe district are chiefly due to the excellent physical condition and natural drainage, promoting a quite exceptional growth of roots, searching for food in a very large volume of soil, which in itself, is rather low in available mineral plant foods.

Tillage. The objects of tillage, which may be subdivided into **ploughing** and **cultivating,** are pretty well the same as those of drainage, and are briefly the following :—

The soil is **loosened,** the roots are allowed therefore to develop readily in all directions, **plant foods** are **liberated** and made **available ; rain** is readily **absorbed,** evaporation checked, **moisture** therefore **conserved** for future use and maintained near the roots ; admits **air** into the soil, which is beneficial to the roots, and more particularly to the bacterial flora of the soil ; promotes **nitrification,** an important process, due to activity of bacteria, by which nitrogenous organic matters are changed, first into **ammonia compounds,** and, finally, into **nitrates**, and are thus made available to the plant roots ; breaks up any **hard-pan,** an impervious layer frequently formed between soil and subsoil, and thus allowing roots to go down to subsoil for plant foods and moisture.

Injudicious working may cause serious **damage** to the orchard ; for the methods of tillage local conditions have to be carefully studied, and the methods more suitable to our climatic conditions may be slightly at variance with some of the rules laid down by Prof. Bailey.

Ploughing must be done thoroughly ; do not be afraid to cut a few roots, as these surface roots cut are of little use during dry weather.

Plough in the **late autumn** and **winter** to a depth of 4 to 6 inches, keeping to the greater depth outside the spread of the branches.

Keep the land as **level** as possible and do not form ridges.

Cultivating is carried out during spring and summer, must be done in a thorough manner, and more particularly, weeding and cultivating should not be attempted in one operation.

The soil must be **stirred deeply** and **frequently,** without actually turning the soil over.

Weeds are prevented to grow, which would rob the soil of a large amount of moisture.

Thorough cultivation keeps the top soil in a state of fine **mulch,** which greatly prevents evaporation by breaking the continuity of the capillaries which bring up the moisture from below.

The old-fashioned idea which exists in some localities of allowing **grass** to grow under the trees, or keeping the orchard under **sod,** cannot be recommended, more particularly, as most of our orchards are grown on rather poor classes of soil. Should it be desired to grow **cover crops,** suitable **green manure crops** should be selected, which will require only a short time for their growth, are then ploughed under, or used as a mulch around the trees.

Green manuring, greatly improves the **texture of the soil,** and increases the amounts of available plant foods, and should be particularly practised from the very **start of an orchard.** As a rule leguminous crops like cowpeas, Mauritius beans, &c., are to be chosen, and ploughed under as soon as they come into seed. There can be do doubt that although the green crop shades the ground, and keeps it cool and moist, a large amount of moisture is required for the growth of the crop and a lot is lost by transpiration through the leaves. In dry seasons, therefore, the green manure crop may rob the trees of some of the necessary moisture.

Mulching keeps trees healthy and vigorous, by shading the soil, and keeping roots cool, retaining moisture, keeping down the weeds, and increasing the amount of organic matters (humus) in the soil. On light-coloured sandy soils mulching prevents the **scalding** of trunk and lower branches by the reflected heat of the sun. Heavy soils are made much looser and easier to work by mulching.

Suitable materials for mulching are bush rakings, compost of all kind, stable manure, rotten straw, cornstalks, weeds, and green manure crops.

The only drawback of mulching is the possibility that it may harbour some of the many insect pests.

Manuring. In my article on "**Complete Fertilisers for Farm and Orchard**" which appeared in the Agricultural Journal, and which may be obtained in pamphlet form from the Department of Agriculture and Stock, I gave mixtures of artificial fertilisers necessary for each variety of fruit trees under normal conditions. I have now to go a step further and consider some of the **abnormal conditions** and find fertilisers for such. Before doing so we must recapitulate briefly the **functions** of the various important plant foods.

Nitrogen more particularly promotes and stimulates plant growth.

Phosphoric acid promotes fructification and hastens maturity.

Potash promotes a vigorous growth of tissue, strong and healthy wood, aids in the production of starch and sugar necessary for fructification, and gives the trees more resistance against frost and disease.

Lime helps potash in the formation of wood, and production of sugars, and is more particularly required for the formation of the stones and kernels. Much larger amounts of lime than of all the other plant foods are required, and especially cherry trees require very large quantities.

When manuring an orchard we have to keep the following **three principal cases** in view :—

1. The fruit trees are in **normal condition** with regard to growth and formation of fruit, and manure is to be applied to **maintain** this **condition.**

2. The trees are **not prospering** with regard to growth and production of fruit, and manures are required to **produce** a normal condition by **increased growth.**

3. The trees are making an exceptional vigorous growth but produce **little or no fruit,** and manures are to be applied to aid in **fructification.**

The smallest amounts of artificial fertiliser required for **Apple, Pear, and Peach trees,** for trees of various size (small to medium) would be for—

1st case: ¾ lb. to 2 lb. superphosphate,
⅛ lb. to ½ lb. nitrolim or sulphate of ammonia;
¼ lb. to ¾ lb. sulphate of potash.

2nd case: ½ lb. to 1½ lb. superphosphate,
¼ lb. to 1 lb. nitrolim or sulphate of ammonia
⅛ lb. to ½ lb. sulphate of potash.

3rd case: ¾ lb. to 2 lb. superphosphate,
No nitrogen,
½ lb. to 1 lb. sulphate of potash.

It is generally better to use instead of superphosphate by itself a mixture of superphosphate and bonemeal, at the same time increasing the amount. None of the above quantities quite come up to the formula given in the above mentioned pamphlet as a complete fertiliser for apples, but, as already stated, the **quantities** given are minimum amounts, and can **profitably be increased.** They are given to illustrate how to modify the application of artificial fertilisers to meet the requirement of different cases, and all other manuring formulæ can be changed in proportion, bearing in mind that for the **2nd case** the amount of **nitrogen is increased** to promote activity of growth, whereas in the **3rd case** the **nitrogenous manure** is **left out** to check the growth.

Of natural fertilisers well-rotted **stable manure** and **compost** are of particular value to fruit trees, as they not only supply the necessary plant foods in proper proportion, but also improve the physical condition of the soil and greatly aid the bacterial activity. To old orchards apply after the winter ploughing from 10 to 15 loads of farmyard manure, and in early spring the dressing of artificial fertilisers, for instance a mixture of 1½ cwt. bonemeal, 1½ cwt. superphosphate, 1½ cwt. sulphate of potash, and 1½ cwt. of nitrolim or sulphate of ammonia per acre.

Lime is, as already stated, an indispensable plant food of fruit trees, and unfortunately, many of our fruit soils are very deficient in lime. The lime may be applied either in form of **quick** or **air-slaked** lime or in form of **carbonate of lime,** limestone screenings, shell sand; the former is to be used in quantities from 10 cwt. to 1 ton per acre for heavy clayey soils, and the latter in quantities from 1 to 2 tons per acre for light soils. Every third year half of the above amounts should be again applied.

APPLICATION OF MANURES.

Frequently the dressing of artificial fertilisers is only applied just under the trees, as far as the branches reach. This method cannot be recommended, more particularly for trees in full bearing, as the root system of well-pruned trees extends far beyond the reach of the branches, and therefore in well established orchards the farmyard manure, compost, lime, artificial fertilisers, should be applied **broadcast** over the whole orchard and the manure chipped or cultivated in.

In old orchards where trees have never been manured, this application of artificial fertilisers to the surface alone may not be sufficient, but should be supplemented by making a few **holes** from 18 inches to 30 inches deep all round the tree (outside the reach of the branches) putting a few handfuls of mixed fertiliser well mixed with soil into each hole. Heavy soils require deeper holes than light soils. This method is of course more laborious but will be found particularly beneficial in the case of old apple, pear, and cherry trees, whereas for plum and peach trees the surface dressing alone is generally sufficient.

These notes were written primarily for the cultivation and manuring of **deciduous trees,** but as the general principles are practically the same, they may be also applied to **citrus fruit trees.** Of course slight alteration may be necessary. For instance, it is always better to apply artificial fertilisers to citrus fruit trees in two or more applications. Again, the working and cultivating of the orchard may have to be modified according to locality and climate, but the **main object** of all orchardists to obtain **more and better fruit,** can only be brought about by carefully putting into practice the principles of cultivation and manuring laid down.

A TIMELY REMINDER.

THE FRUIT FLY PEST.

BY CHARLES ROSS, Instructor in Fruit Culture.

How to check the ravages of the fruit fly, and how to compass the extermination of this orchard pest, has always presented itself to orchardists and entomologists as a problem which up to the present remains unsolved. Various have been the means adopted to this end, but at best only indifferent success has rewarded the experimentalists. It seems as though we must await the discovery of some parasite which will prey upon the fruit fly only, and not attack useful insects when the work of extermination of the fly has been completed, as in the case of the mongoose, which was imported into the West Indies to destroy the snakes, and, when that was satisfactorily achieved, played havoc with ground game and poultry.

Mr. Charles Ross, Instructor in Fruit Culture under the Department of Agriculture and Stock, writing on the subject of the fruit fly, says:—" The early months of the growing season embrace the most important period for the destruction of fruit flies, and it is perhaps necessary to remind those who have not already destroyed the remnant of the summer orange crop that they should immediately do so, either by burying or boiling all unmarketable and infested fruit. Fruit flies, as a rule, do not appear in the orchard of the Warwick and Stanthorpe districts until the season is well advanced, and this to a great measure proves that the fly is not bred there during the winter, but is introduced from the warmer districts. Therefore all those interested should unite to fight the danger when it appears. It may not be so necessary to remind those who look to fruit-growing as a source of income as the amateur,

whose few ill-kept trees are a menace to the industry. Spraying is absolutely useless to check this pest. The best practical means known for preventing its spread is to examine all fruit before packing and destroy the affected portion, together with all windfalls. There are several remedies of great service. Deep raking or shallow cultivation beneath the trees will enable fowls and other birds to get at the maggots that have previously entered the ground. The maggot, after leaving the fruit, burrows in the earth to a very shallow depth, from which it issues a full-grown insect within about three weeks, so that every fly or maggot killed prevents many broods developing. The whole orchard should be periodically cleaned, preferably soon after rain. Lime, soda, kerosene, and caustic top dressings, applied separately to the soil surface, are all fatal to the grub. Covering the trees with fine-meshed netting before the fruit changes colour is a very effective means of protection. Many flies may be caught by hand or by means of a net. Another simple device is to hold a piece of lath in each hand when a fly settles, and, while holding one lath behind the fruit, to strike the fly with the other. Leaving a single tree ungathered often localises the evil, and thus the maggot can be more easily destroyed. Suspending obnoxious substances in the trees, as well as tempting odours with poison, have been tried, but without much success. Kerosene tins placed here and there in the fruit garden as receptacles will often act as preventives to visitors spreading the fly. It often happens that after opening a tempting-looking peach disappointment leads to the fruit being thrown underfoot, where the maggot finds a congenial home to hybernate. I would point out that, above all, concerted action is required, and regulations cannot be too stringent to prevent infested fruit from being distributed. Owners of private gardens might be of great assistance to the fruit-grower by exercising vigilance and care when making presents of fruit. Generally the orchardist combats this pest. It is the private owner of a few trees only who, either through ignorance or through carelessness, is the chief offender. Consumers and non-producers might also assist the man on the land if they were willing to give this subject a little thought, and be more careful in disposing of diseased fruit.

A prolific breeding-ground for the fly is an abandoned orchard, where the trees are left to themselves. It would be well if Shire Councils would enact a by-law compelling owners of such places to uproot the trees, and, failing their doing so, to carry out the work at the owners' expense, as in the case of noxious weeds.

NOTES ON A HERBERTON ORCHARD.

Mr. C. Ross, Instructor in Fruit Culture, has received from Mr. Charles Harding the following short notes on the fruits and grapes growing in his orchard at Herberton. Although this district is situated between the 17th and 18th degrees south latitude, and is therefore well within the tropics, yet, owing to its great elevation above sea-level (2,890 feet), it enjoys a delightfully temperate climate, and is hence

eminently adapted to the cultivation of such fruits as apples, peas, plums, grapes, &c.; and wherever these have been planted, the results have been most encouraging.

Mr. Harding says of his apple-trees: "Owing to the rains in July, some the trees blossomed early, and the frost, coming along later, killed many of the blossoms. Those that survived are looking well, and the late blossoms are setting well. My big apple-tree will have a record crop. With regard to the plums, although the trees blossomed freely, they failed to set, and we only have a few fruit. The Isabel grapes are a splendid crop, but the better varieties suffered somewhat from frost; still, they are doing very well. This remark applies to Black Prince, Ferdinand de Lesseps, Gotha, and Muscatel. Of persimmons, there is a great crop, and they could easily be grown here in quantity for export. The lime-and-sulphur treatment is keeping the trees clean and healthy. Those planted last year are making good growth."

Replying to Mr. Harding's interesting letter, Mr. Ross said:—

"I fear you will never have very much success with plums generally, owing to the short period of rest and probably unsuitable varieties. The Goose plum and two or three of the Japanese are the only varieties worth continuing in your district.

"The plums cannot bear well where subsoil atmospheric conditions change suddenly, such as water-logging and dryness at the roots, cold and hot snaps, especially at the flowering and setting periods. A thick heavy mulch to keep the roots cool and moist, with good drainage, is the best safeguard. Cincturing the branches when blossoming would help them to set and hold the fruit.

"Lime will improve your soil, but I should recommend a fertiliser containing nitrolim or nitric of lime as well.

"I enclose a pamphlet on 'Fertilisers.'"

A SIMPLE AND PRACTICAL RAT TRAP.

The "Revue Agricole," of New Caledonia, gives the following description of an effective rat trap, as published in the "France Australe." The writer says:—"Having broken a large piece out of the neck of a large jar, I condemned it. But one of my children got hold of it and buried it upright in the ground, near the barn, just up to the bottom of the crack, leaving only what remained of the neck above ground. Then he dropped into it a few grains of maize, and covered it with a flat stone. What was my surprise, a few days later, when removing the stone, to find nine large rats and four mice in the bottom of the jar. This was a revelation, so, having killed the rodents, I renewed the supply of grain, put a board over the mouth, and weighted it with the stone. Next day, I found in it five rats and two mice. I have continued baiting this trap, and every day I capture one or several rodents. Such a trap gives excellent results, and, as it costs absolutely nothing, it is within the means of everybody."

Tropical Industries.

COCONUTS IN THE INNISFAIL DISTRICT.

BY HOWARD NEWPORT, Instructor in Tropical Agriculture.

It is always of interest and generally of value for primary producers to see what others in the same line are doing. They may be able to hear about progress made, but that it not half so valuable as seeing it. While admitting this, it is, nevertheless, difficult—in fact, often quite out of the question for many reasons—for growers, anxious to see and learn and equally ready to relate their own experiences, to spare the time and cost in this country of great distances to do more than occasionally visit their immediate neighbours. Hence it is thought that a series of snapshots, with a few words of explanation from time to time, may be of interest, mutual benefit, and perhaps be the means of putting growers of any given staple in communication with each other, should they so desire it.

Coconut culture has been receiving considerable attention recently, no doubt largely due to the rise in price during the last few years of both the whole nuts locally and of copra in the South. During a tour in the Innisfail district, I noted that the progress made in the direction of coconut-planting is most marked, and is as gratifying as it is extensive. Most of the settlers along the coast south from the mouth of the Johnstone River have more or less of a coconut clearing coming on. Some have a few old trees, and some of the older settlers have small plantations that have been in bearing for many years, and which, latterly, have proved an appreciable source of income, not only by the sale of seed nuts to others, but also from the enhanced market for whole husked nuts.

In this district there is some very fine land for coconut-growing, especially in the vicinity of Maria Creek, near the Adelaide Steamship Company's tramline, and thence down the coast to Tam o' Shanter Point, or even further south. The climate of these parts is ideal for coconuts; the rainfall is rather on the heavy side, but not too much so, and they may here enjoy all the sun and air that coconuts delight and thrive in. A good market for the whole nuts is at present to be found at Townsville, whence a small steamer plies weekly to Maria Creek. Seed nuts, the transport of which is an item for consideration generally, are obtainable in the locality from the older plantations referred to.

With all the essential and most favourable conditions, therefore, it is not surprising that many have chosen this locality for opening coconut plantations, but there is room for hundreds of acres more.

The first plantation is one that generally attracts the attention of visitors to Innisfail on account of its somewhat conspicuous situation, just inside the mouth of the Johnstone River, at Flying Fish Point. For the same reason, and in view of its being only a pleasant half-hour's run

by motor boat from town, it is frequently used by the residents and visitors to Innisfail as a picnic resort; and no prettier place could be chosen, for a well-kept coconut grove is as fine a sight from the interior as it is from the distance. The illustration marked No. 1 shows the Flying Fish Coconut Plantation, taken from the water when passing in the launch, which meets the large boats anchored outside the river bar; and No. 2 gives a good idea of the inside of the same plantation. This

Fig. 1.—Flying Fish Point Coconut Plantation, from the sea.

Fig. 2.—In the Flying Fish Point Coconut Plantation.

PLATE 4.—COCONUTS IN THE INNISFAIL DISTRICT.

is one of the oldest plantations in the district, and was planted by Dr. Maroney some 20 years ago or so. This does not imply that it is old, for the coconut tree will live to 100 years, and a well-planted grove will bear for 60 or 70 years easily, so it is only now in its prime. In just this point lies one of the greatest advantages of coconuts as a staple, for once established, no matter how neglected or abandoned, nothing short of repeated fires will kill out the trees, which go on growing and maturing. Whether the reason of the temporary abandonment be the low prices such as were experienced a few years ago (but which we have no reason to anticipate again in view of the demand being so much in excess of the supply), or whatever the reason be, the coconut grove may be taken in hand again at any time, and will at once respond to attention, and produce crops that are far less susceptible to the variations of the seasons than most other tropical tree crops.

The Flying Fish Point Plantation was well planted in the first instance, to which fact it owes its present good condition, and which I regret cannot be said of all our coconut groves. The trees are of several different varieties, but all the thousand or so, planted there about 25 feet apart, seem to have been carefully selected. This distance I consider about the minimum for coconuts in these parts, preferring to see them 30 feet apart where possible. This plantation was leased for some years to Chinamen, who—latterly, at any rate—appear to have done well out of the crops obtained; but for the last few years it has been under the control of Mr. J. C. McGreevy, of Innisfail, and is being worked by white people. Fig. 5 shows the caretaker's little cottage there, which is situated near the river front and about midway in the 14 or 15 acres that are planted with nuts, and which are in a long, narrow strip, as may be seen from the first snapshot.

Another fine plantation of about the same age is that of Messrs. Cutten Bros., at Bicton, Clump Point (Fig. 3). These gentlemen have about 45 acres under coconuts in all, in various plots or fields on their large estate. The plot in Fig. 3, the oldest, is perhaps 10 or 12 acres in extent, and is bearing well. This—and, in fact, nearly all their land under coconuts—is away from the foreshore and in much heavier soil. but the quality and luxuriance of growth of the trees are none the less on this account. Messrs. Cutten Bros. are so satisfied with the present returns from their bearing areas, as well as with the prospects of continued high (and probably still higher) prices for the product generally, that they are increasing their areas. Fig. 4 shows one of their young clearings of coconuts, with bananas planted as a catch crop for the first few years until the coconuts attain such a size as to require all the soil and space for themselves.

This utilisation of the land by catch crops, as seen also in Mr. Unsworth's young clearing (Fig. 8), where pineapples have been selected for the purpose, is a sound one. The catch crop pays all expenses of upkeep and more, while the cultivation afforded it is generally all that the young trees of the permanent crop require. This catch-cropping can, of course, be overdone, and some care is necessary in selecting the

kind of crop, as also in following it by a leguminous crop (which may be turned into a permanent cover crop later), to repay any loss of plant

Fig. 3.—Messrs. Cutten Bros.' Coconut Plantation, Bicton, Clump Point.

Fig 4.—Young Coconuts at Bicton, with Bananas as Catch Crop.

PLATE 5.—COCONUTS IN THE INNISFAIL DISTRICT.

foods the fields may have suffered. Catch-cropping, however, ensures a certain amount of cultivation and at least weeding, which, in this country, is otherwise too often inconvenient to afford and is neglected.

On Bicton, and at one end of the plantation shown in Fig. 3, a remarkable instance of the ready response of the coconut to cultivation may be seen in several trees that are growing alongside the kitchen

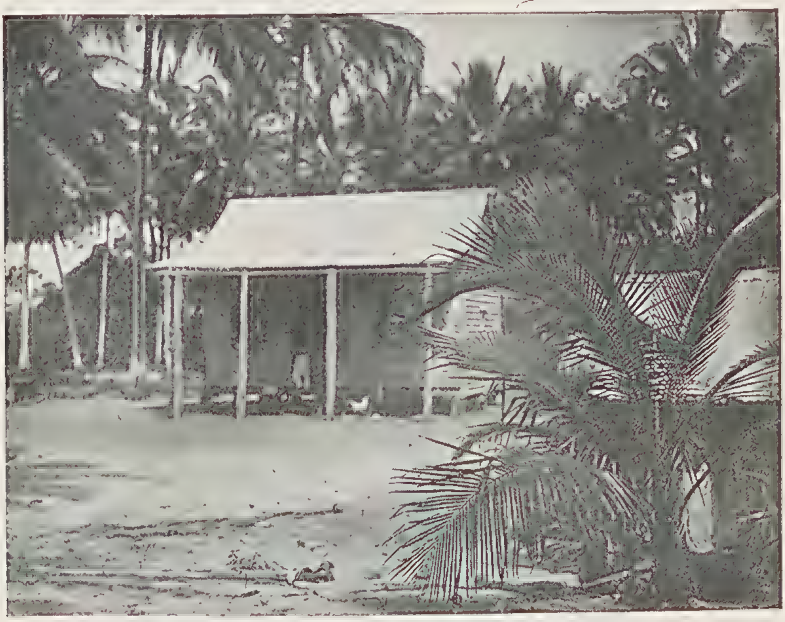


Fig. 5.—Caretaker's Cottage at Flying Fish Point.

Fig. 6.—Mr. R. B. Porter's Coconuts at Clump Point.

PLATE 6.—COCONUTS IN THE INNISFAIL DISTRICT.

vegetable garden, the frequent stirring of the soil and manuring of which have been taken advantage of by the coconut tree roots to such an extent that both the number and size of the nuts is in obvious contrast to those of trees that have not had similar opportunities.

Mr. A. J. Unsworth, "Narragon" Coconut Plantation (Figs. 7 and 8) is also on the foreshore, though mostly on rising ground. To get a comprehensive view of this, it would be necessary to get a boat and push

Fig. 7.—Mr. A. J. Unsworth's Coconut Plantation, Narragon, Clump Point.

Fig. 8.—Young Coconuts at Narragon, with Pines as a Catch Crop.

PLATE 7.—COCONUTS IN THE INNISFAIL DISTRICT.

off a little distance from the shore. Narragon is a somewhat younger plantation than Bicton, and is particularly healthy and vigorous. Some trouble was experienced here with small beetles apparently attacking

the blossom and thereby reducing the crops, but these are now disappearing; and, the trees being mostly within reach, by the use of a spray, the trouble will be eliminated hereafter. The Narragon Plantation has a total area very nearly equal to that of Bicton, but the greater part of it is under three years of age. One clearing of two-year-old trees (Fig. 8) is doing particularly well among pineapples, which are being grown as a catch crop.

Mr. R. B. Porter's Plantation (Fig. 6) is, in the main, younger again, but is coming on well. This is some 20 acres in extent at present, and is situated between Clump and Tam o' Shanter Points. About half is on fairly level land of light sandy loam near the foreshore, and the rest, further inland, on scrub land of reddish chocolate loam, where the trees are planted among bananas, so that, when the latter give out, this gentleman also will have his permanent staple very nearly, if not already, bearing its maiden crop.

There are several other smaller plantings in the locality, all of which are promising well. Some fine little plantations also exist in the vicinity of Mourilyan, which may be illustrated at some future time; while the splendid and heavily bearing trees around the Mourilyan Syndicate Plantation manager's residence are an object lesson to all in the district that see them.

There seems no doubt that in time this district will be one of the principal coconut-growing centres of the State, and is a locality worth inspection by those who contemplate coconut culture, and who are seeking a safe and permanent agricultural investment.

GROWING YAMS.

Mr. C. E. Wood, Manager of the Kamerunga State Nursery, Cairns, in one of his last articles published in this journal, introduced the matter of yam-growing. In the early days, when some thousands of kanakas were employed on the sugar plantations, yams were very largely grown, as they formed part of the labourers' rations, and were much appreciated by them. Since black labour ceased in Queensland the cultivation of the yam has fallen into the background even in Mackay and farther North. In the West Indies the yam is regularly used not only by the coloured natives, but by the white population generally. Here, it appears to require an educated palate. This may be owing to its glutinous nature, which few, in this State, appreciate. Yet it is an excellent vegetable, and one which will thrive under conditions where the more favoured sweet potato would not do so. The yam requires a warm, damp climate to be produced to perfection. It is propagated by setts from the roots, or by small bulbs which are planted in the same manner as seed potatoes. The land is usually lined out in rows 3 feet apart, the setts being planted 3 feet apart in the rows. The best planting season is September, and the crop will be ready to take up in from five to eight months, according to the variety planted. They are the better for being

moulded up two or three times during growth. The roots penetrate perpendicularly into the ground, often to a great depth. If they encounter no obstacle, such as a hard subsoil, the tubers grow very long and thin, or else they thicken out at the bottom in such a way as to render it a matter of difficulty to dig them out whole. In order to induce a proper growth, they are usually planted in comparatively shallow soil, or, if such is not procurable, then a flat stone or board is laid at some depth below the sett. After planting, a stout stake is set near the hole. When the shoots appear, they run very rapidly, and climb up the pole. The Papuan natives, who grow large quantities of yams in their gardens, often lay branches over the setts and allow the vines to run over these, thus giving the plants air and preventing a luxuriant growth of weeds. The after cultivation is trifling, and consists in weeding and loosening the soil; and where poles are used, the cultivator can be run between the rows, and with a Dutch hoe the weeds can be destroyed close up to the plant. The best known edible kinds are *Dioscorea bulbifera, D. aculeata, D. globosa,* the latter the most highly esteemed kind in India. The bulbs of *D. rubella* attain a length of 3 feet. *D. alata* (the winged yam) is the most productive. The Cush-Cush Yam (*D. triphylla*) is called in Jamaica the Indian Yam; and in British Guiana it is known as the Buck Yam. The tubers are roundish, and rarely exceed 9 inches in length and 3 inches in diameter. It is the smallest and most delicate of all the yams. The plant is prolific, sometimes bearing a dozen tubers on the roots.

MEDICINAL AND OTHER PROPERTIES OF THE PAPAW.

The milky juice of the unripe fruit of the Papaw Tree is admitted by high medical authority to be an efficient vermifuge, and a similar property is possessed by the seeds, which have a pleasant flavour resembling that of cress. The juice is also a good cosmetic, which is used for the removal of freckles. But the most remarkable thing connected with the Papaw Tree is the property possessed by the milky juice of the unripe fruit of separating the fibres of flesh and making it tender. The late L. A. Bernays, who was undoubtedly a reliable authority on the properties of plants and fruits, says, in his valuable work on "The Cultural Industries of Queensland," that this property is not confined to the juice of the fruit, but the very exhalations of the tree are said to possess it; and of this fact the Brazilian butchers take advantage to make their toughest meat saleable. This is accomplished by suspending the newly-killed meat in the tree, or by wrapping it in the leaves. So powerful is this softening action of the juice that it must be used with caution, or the meat will drop to pieces, which makes it more unpalatable than if left in its original condition of toughness.

Some interesting experiments were made some years ago upon this subject at the Royal Agricultural Museum, Berlin. A portion of the juice was dissolved in three times its weight of water, and this was placed

with 15 lb. of quite fresh, lean beef in one piece in distilled water, and boiled for 5 minutes. Below the boiling point, the meat fell into several pieces, and at the close of the experiment it had separated into coarse shreds. The juice can be dried without losing its effect, but its efficiency in this respect does not appear to have been tested over a longer period than six months. For roasting or baking, the best method is to wrap the meat in some of the leaves; and for boiling, to add to the water some of the expressed juice or a piece of unripe fruit. The exact proportion to be used, and the time to be employed to render meat tender without softening it too much, can only be learned by experience; but in a hot country, where meat is necessarily cooked so soon after killing, a method by which it may with certainty be served tender, without detriment to its flavour or wholesomeness, is worth taking some trouble to determine. There can be no doubt concerning this property of the papaw juice and leaves, for we have frequently rubbed tough beefsteak with the milk of the unripe fruit, with the result that the meat could be pulled to pieces with a fork on the following morning. The milk has a remarkable effect in eradicating corns and warts. A decoction of the leaves is a wholesome medicine in internal fevers. The dried leaves mixed and smoked with tobacco, or alone, afford great relief in cases of asthma. For dysentery the ripe fruit is a sovereign remedy.

The papaw is so easily grown in all parts of the coastal country of Queensland, producing fruit in 8 to 10 months after sowing, that, for the sake of the properties mentioned, there should be a few trees in every garden or backyard in the coastal towns.

UTILISATION OF SISAL WASTE.

Commenting on the possible value of sisal waste, of which millions of tons of fleshy matter and juice are annually produced in the great sisal-growing countries, the "Philippine Agricultural Review" says:—

"As to the utilisation of sisal waste as a fertiliser, the Press Bulletin No. 35 of the Hawaii Agricultural Experiment Station, 12th June, 1912, mentions the belief that this is the best economic utilisation that could be made of the waste at the present time. It states that the value of the waste for fertiliser purposes is estimated at 6 dollars (25s.) a ton, and is consequently greater than the value of the fermentable substance for alcohol production. Herbert and Heim are also mentioned as having reached the above conclusion.

"The utilisation of sisal and henequén waste in the fresh form as stock feed is also reported to have given fairly satisfactory results in some countries. The waste contains a fairly high percentage of sugar, from which it derives its nutritive value; and it is believed it will give very satisfactory results, especially when it is used in the dry form and mixed with other feeds."

Viticulture.

GRAPE VINES—A NOTE ON SUMMER TREATMENT.

By CHARLES ROSS, Instructor in Fruit Culture.

In the case of vines that have been properly spurred back at the winter pruning—*i.e.*, each spur pruned to one, two, or more eyes according to the vigour of the canes and the variety of grapes—each bud should have put forth one or more shoots. Where more than one shoot occurs, the weakest should be rubbed off, leaving one shoot only at each node. If the vine is not a vigorous grower, one shoot may be sufficient to leave on each spur; on the other hand, where growth is rampant, two or more shoots may be allowed to proceed from the spurs. Overcrowding is to be avoided by entirely suppressing some of the intermediary shoots where the long spur or cazanave method is adopted.

It often happens that amateurs and inexperienced growers leave many more bunches on the vine than it can properly support, especially in the case of young vines of three years old, and the consequence is that the bearing period, and even the life of the vine, is shortened or its production diminished in after years; therefore the disbudding of fertile shoots may be equally important with that of the barren ones. The uppermost shoot, or shoots, of a spur generally absorb an undue amount of sap to the detriment of the base shoot; such growth must be carefully watched, and, if extraordinary vigour is produced, it may be checked either by bending down or pinching out the terminal points. The side branches from these shoots, called laterals, produced from below the node where the bunch is situated, should be rubbed out; but laterals from the nodes at and above the bunch may be pinched at the first or second leaf. The lower shoot of a spur—*i.e.*, the one nearest home—should be encouraged to grow strong, as this will constitute the fruiting spur for the following year. Indiscriminate topping must be avoided. The leading shoots of the vine should be allowed to extend their growth almost to an unlimited extent, and only in cases where they are outbalancing the vegetative activity of the vine should they be stopped. It is even better to bend down the shoots than to top them. The object of this method is to preserve as much well-grown foliage as possible for the accumulation of sugar and elaboration of sap for the benefit of the fruit and lignification of wood. The bunches are always better developed, more handsome in appearance, and of higher quality when ripened in the shade; but when it becomes too dense it is better to strip off a few of the older leaves at the base that have fulfilled their purpose than to cut away the branches.

For the prevention and suppression of "oidium" and "powdery mildew," the vines should be dusted with flowers of sulphur in early spring, and this operation should be continued at intervals of two or three weeks right up to the time when the grapes begin to colour.

Animal Pathology.

VACCINATION AGAINST HOG CHOLERA.

[CONTINUED FROM DECEMBER ISSUE.]

Vaccinating Instruments.—Two hypodermic syringes are used in vaccinating—one for the serum which holds either 20 or 30 cubic centimeters, and one for virulent blood which holds 5 cubic centimeters. The two sizes are used to prevent any mistakes. A thermometer is used to take the temperatures, as we make it a rule not to use virulent blood, but serum only, if the temperature is too high. Before injecting the serum, use a small scrub brush and thoroughly clean the field of operation. Strong antiseptics are used here both before and after injecting, especially where the virulent blood is injected. If this is not done, the small drop on the end of the needle may infect the whole premises. This is very important. The wound may also become infected and cause abscesses, and even blood poisoning, if not thoroughly disinfected.

The Serum.—The "serum" is the defibrinated blood drawn from a hog made hyper-immune by injecting a quart or more of defibrinated cholera blood into the ear veins of an immune hog. A very small amount of a weak solution of carbolic acid is added to the serum to help to preserve it. The serum is very easily spoilt after it is exposed to the atmosphere, heat, or cold. It is also very easily contaminated, and will then cause abscesses, or, if the proper organisms are present, may even cause the death of the hog. A constant temperature of from 45 to 50 degrees will keep the serum in a sealed bottle for many months. A very small amount of dirt or dust in the serum or in the wound made by the needle in vaccinating may cause abscesses or blood-poisoning.

Controlling the Disease.—As soon as an outbreak is noticed, all the hogs should be confined in as small an enclosure as possible, and at once vaccinated with the serum-alone method. Ten days later, they should be given the simultaneous method. They should be kept away from creeks and rivers, and the whole place quarantined as far as the neighbours are concerned. At the same time all the healthy hogs on surrounding farms for some distance from the infected ones should also be vaccinated with the double method. This will usually check an outbreak which might otherwise get beyond control.

When Not to Vaccinate.—If the hogs are unthrifty, or have some disease; if they are badly infested with worms, or are mangy; if their pens or yards are not in a sanitary condition; if they cannot be given proper shelter, feed, and care—in fact, if it cannot be done under proper conditions, it is best not to vaccinate at all, as the results will frequently be far from satisfactory.

Vaccinating the Pigs.—If there is no danger from the cholera, vaccination should be deferred until the pigs weigh from 40 lb. to 60 lb., unless

they are from simultaneously immunised sows, in which case they should be vaccinated at the age of from 4 to 5 weeks.

Effect of Vaccination on the Offspring.—When the serum-alone method is used, vaccination does not seem to have any noticeable effect upon the offspring. When either the serum simultaneous or the double method is used, the offspring from sows so vaccinated seem to possess a greater or less immunity, which, after about 4 weeks, they gradually outgrow. A pregnant sow can be safely vaccinated at almost any period with the serum-alone method if she is carefully handled, but there is more or less danger in using the simultaneous method upon sows well advanced in pregnancy.

Stocking Up after an Outbreak.—The first thing to do after an outbreak is to disinfect the premises, houses, and lots as thoroughly as possible. If the lots and pastures can be changed, so much the better. If possible, the new stock should be vaccinated with the simultaneous method. . . .

Forms of the Disease.—Hog cholera is very contagious, but affects swine only. It appears usually in one of two forms, either acute or chronic. It is caused by the germ in the blood tissues and discharges of the hogs. . . . In favourable locations it seems to live for many months. The acute form usually kills in from 6 to 16 days. The chronic form is more mild and runs a slower course, the hog continuing sick for a month or more before either death or recovery takes place.

Conditions Favouring the Disease.—Overcrowding in the sleeping quarters, especially where different-sized animals are kept in the same pen, favours the spread of the disease. The smaller pigs become too hot, and then very easily catch cold. Damp, filthy, dark pens, where little fresh air or sunshine can reach; sleeping in a draught under buildings or windows; too much green corn; too close breeding or inbreeding; the accumulation of vermin on the animal itself or in the pens; too exclusive a corn diet—these are additional conditions favouring the spread of cholera. The hog, being frequently a scavenger, following cattle in all kinds of mud, filth, and dust, is likely to take in germs or irritating dust, and the lungs consequently become infected with tuberculosis or other debilitating disease germs—in fact, anything that has a tendency to weaken the system of the animal renders him a more fit subject for hog cholera.

Age.—While the disease has no respect for the age, size, or breed of hogs when it once starts in a drove, it is usual for an outbreak to start with the younger pigs, and, later, to attack the more mature animals. But this is not always the case.

Symptoms.—Cholera usually starts with a diarrhœa. The pigs quit feeding, many have coughs, and are dumpish for several days, lose all energy, gradually become weaker, and die. The older hogs usually act in the same way, except that they do not become so thin before they die. Sometimes a constipation precedes the diarrhœa for a longer or shorter period. The discharges are usually very offensive. There is frequently

a discharge from the eyes which resembles pus, but may be sticky enough to gum the lids together.

In some outbreaks, one or two hogs may not feel well for several days, and, before the owner is aware of the fact, the whole herd may be infected, and a greater or less number die every day. Some may show symptoms of a severe illness, such as fever, weakness, loss of appetite, diarrhœa, redness of the skin of the abdomen on flanks and in patches around the snout or ears, while others may show but a few of these symptoms before death.

Conditions or Diseases which Resemble Cholera.—Some conditions or diseases which resemble cholera are:—Tuberculosis, although this disease is usually much slower in its progress; ordinary digestive troubles, due to improper feeding or to insanitary surroundings; anthrax, pneumonia, caused by dust, cold, or worms. Garbage which contains much soap, lye, or salt, will frequently cause death with symptoms resembling cholera; so also will mouldy bread, cotton-seed meal, new corn, or too sudden changes of feed. Many things which are unfit for human food are thrown into the swill barrel to form toxins and ptomains. These may cause vomiting, bloody diarrhœa, griping, nervous trouble, weakness, staggering gait, dullness and death—all of which may, in some stages, resemble cholera.

Season of the Year.—Hog cholera is mostly a warm-weather disease, but is also prevalent in the fall of the year and early winter. During cold weather, the cases, as a rule, become more chronic; the hogs do not die so suddenly, and a greater per cent. of them get well.

Manner of Infection.—Since cholera is a contagious disease, it follows that the germ must be carried into a herd. It is distributed somewhat on the same plan as are those of typhoid fever, scarlet fever, or diphtheria in the human race. The germs are present in the blood and tissues of the affected animals, and are thrown off through every avenue of the body, especially through the urine and fœces. In this way, they infect the whole yard in which hogs are kept, and also everything in the yard and pens. The smallest particles of dirt, dust, or straw—so small that they cannot be seen—can carry enough germs to infect several herds of hogs. It is thus apparent that a stranger should not be allowed near the pens of sick hogs; neither should the attendant be allowed to leave the vicinity of the pens without first thoroughly cleaning and disinfecting his shoes or putting on others not infected. Dogs, cats, rabbits, rats, chickens, crows, pigeons, and other birds—in fact, every living thing—should, so far as possible, be kept away from the infected places.

Public Stockyards.—It seems that we must consider all public stockyards infected with cholera. Persons walking from these public yards to the depôt platforms naturally infect these places. It is in this way that a crated breeding hog, shipped by train, becomes exposed to the disease, and may infect the whole premises when released from the crate. It is, therefore, not safe to take a hog upon a public highway, unless it

is vaccinated, especially if there has been cholera anywhere in the vicinity. In the fall of the year, during severe dust storms, the germs may be blown a considerable distance with infected straw, weeds, &c.

After shipping, a hog should be dipped as soon as removed from the crate, and kept away from all others for several weeks, and then dipped again before being allowed to come in contact with the rest. If a hog shows signs of sickness, it should be removed immediately and kept by itself until well.

Period of Incubation.—The time required for a hog to become sick with cholera, after being exposed to the disease, varies usually from 6 to 14 days, but sometimes runs much longer.

Prevention of the Disease.—When we recall the conditions which favour the disease, and the manner in which the infection takes place, it will be seen that the feeding and care of hogs have much to do with the prevention of the cholera. Hogs should be provided with clean, dry pens; regular and proper feeding; comfortable sleeping quarters; plenty of sunshine; proper ventilation, as a pig requires twice the breathing space for every 100 lb. weight that is needed by either a horse or cow. The pens should be cleaned and disinfected regularly. The hogs themselves should be dipped every few weeks when the weather is suitable. Maintaining these conditions helps to keep up the vitality of the hogs, and in this way troubles of all kinds are warded off. To aid digestion and circulation and to prevent worms, many hog-raisers feed at regular intervals some of the following mixture, especially where the animals are confined to a small lot, the dose being 1 tablespoonful to every 100 lb. of hog:—

Wood charcoal	1 lb.
Sulphur	1 lb.
Sodium chloride	2 lb.
Sodium bicarbonate	2 lb.
Sodium hyposulphite	2 lb.
Sodium sulphate	1 lb.
Antimony sulphide (black antimony)	1 lb.

Worms in Hogs.—Hogs affected with worms in the intestines run down in condition; become very thin and scurvy; the back is arched, the eyes dull. The hogs refuse to eat, walk stiffly, and appear lifeless. The worms may be very numerous, and, in bad cases, completely fill the intestines. Many of the pigs die if not treated. To secure the best results, affected hogs should receive individual treatment. Twenty-four hours before administering treatment, very little feed should be given. Then give the following medicine, as a drench if necessary, to each 100-lb. hog. Larger or smaller hogs should receive a dose in proportion:—

Oil of turpentine	4 drachms
Raw linseed oil	6 ounces

If necessary, repeat the dose in four days. After the worms have been removed, give the tonic recommended above to put the pigs in condition.

Disinfection.—All straw, cobs, and litter should be removed and burnt, and a strong solution of some good coal-tar dip, or crude carbolic acid, about 1 part of the dip to 20 of water, used on all woodwork and floors of the pens. Slaked lime, scattered over the ground and floors every few days, will help to keep them clean.

Post-mortems.—Care should be taken to prevent blood-poisoning of the operator in the *post-mortem* of any animal. If a person has any sore on his hand, he should not touch a dead animal, or, if he should receive a cut or scratch during the examination, the hand should be placed in pure kerosene at once, the sore well filled, and the bandage saturated with it.

When a hog has died quickly, within a few days after taking the disease, the kidneys frequently show dark spots on the surface. These resemble the spots on a turkey egg. Parts of the lungs may be found solid and dark, resembling the liver, or they may show bright blood spots or there may be many smaller ones. As a rule, these do not show in the glands, especially those along the intestines, are usually enlarged and dark. The intestines may contain blood or bloody fœces.

In chronic cases, in which the hog lingers for a longer period before death, some of the above conditions may show prominently, while others may not show at all. In these cases, ulcers are usually found on the inner lining of the large intestine, which may be as large as an inch in diameter, or there may be many smaller ones. As a rule, these do not show in the more acute forms of the disease. It seldom happens that all these conditions are found in the same animal, but any two of them are enough to warrant the diagnosis of hog cholera. When the ulcers in the intestines and the "turkey-egg kidneys" are found, they are almost positive evidence that the hog died of cholera.

The Serum.—The Veterinary Department of the Agriculture College at Manhattan states that the cost of the serum is 1½ cents (1 cent = ½d.) per cubic centimetre, or about 35 cents for a pig weighing from 20 to 50 lb. The serum will not cure cholera, but is only a preventive. In the beginning of an outbreak, vaccinating, if properly done, saves the greater part of the herd, but it does less good after a herd has been thoroughly infected. It is, therefore, necessary to act promptly.

The serum is put up in bottles of 50 cc., 100 cc., 200 cc., 500 cc., and 2,000 cc. Virulent blood is sold at the same price. (cc. or cubic centimetre = ·061 cubic inch. 50 cc. = $3\frac{1}{20}$ cubic inches.)

SCALE OF DOSES OF VIRUS AND SERUM.

VIRUS.

·05 cc. per lb. weight for suckling pigs.
·5 cc. for all weights between 10 and 40 lb.
1 cc. for all weights between 40 and 80 lb.
1·5 cc. for all weights between 80 and 120 lb.
2 cc. for all weights over 120 lb.

SERUM.

1 cc. per lb. weight up to 10 lb.
10 cc. for all weights between 10 and 20 lb.
20 cc. for all weights between 20 and 50 lb.
30 cc. for all weights between 50 and 75 lb.
40 cc. for all weights between 75 and 100 lb.
50 cc. for all weights between 100 and 150 lb.
60 cc. for all weights between 150 and 200 lb.
70 cc. for all weights between 200 and 250 lb.
80 cc. for all weights between 250 and 300 lb.
90 cc. for all weights between 300 and 400 lb.
100 cc. for all weights over 400 lb.

The above doses of serum may also be used in the serum—alone and double methods.

A FEW PRECAUTIONS AND HINTS.

Keep the serum in a constant temperature—as near to 50 degrees as possible.

Do not remove the cork until you are ready to use the contents of the bottle.

Keep the serum as much out of the light as possible, and do not expose it to the direct rays of the sun.

After the bottle is opened, use the virus within 36 hours.

After the serum bottle is opened, use the serum within 10 days.

Do not let the virus or serum freeze.

Burn all the remaining virus to prevent accidental spread.

All instruments should be sterilised before using.

The field of operation [place of injection] should be aseptic, or thoroughly disinfected with a good antiseptic solution.

The animals should be kept in a clean, comfortable place for several days both before and after vaccinating, and they should be fed very little corn.

There is only one way of positively diagnosing hog cholera; and that is, by a *post-mortem* examination.

There are many troubles of swine that are called hog cholera, and yet they have very little resemblance to that disease.

If a hog misses a feed, watch him; if he misses the second feed, remove him from the herd, and thoroughly disinfect where he has been.

A cough in a hog can usually be traced to one of three things—dust, worms, or cold; but there is no telling what it may result in.

Pneumonia kills many pigs before they get used to sleeping in damp pens or draughts.

If the hogs are dying and the cause cannot be found, get an expert to hold several *post-mortem* examinations.

Whether the herd is sick or healthy, air-slaked lime scattered in the pens and houses will pay well for the trouble.

Thumps.—A spasmodic action of the diaphragm, caused from over-stimulation, too much dust, too much heat, too many worms, too much anything.

Cholera usually affects the younger pigs first.

General Notes.

SOME PHILIPPINE BANANA RECIPES.

The banana is rarely seen at table in Queensland in any other form than as the ripe fruit, but in most tropical countries it is also used as a vegetable. The following somewhat unusual recipes by Mrs. O. W. Barrett have been published in the November number of the "Philippine Agricultural Review":—

BAKED BANANAS.

Baked Bananas; as a Dessert Dish.—In an enamelled dish place thin lengthwise slices of Sabá, covering with a thick sprinkling of brown sugar dusted with a bit of cinnamon; add one-fourth teaspoonful of butter for each slice. Bake till the Sabá is translucent and syrup has formed from the Sabá juice and sugar.

Baked Bananas; as a Vegetable.—The Latundan and Sabá are best for this; only perfectly ripe fruit should be used. The unpeeled fruit should be placed in an enamelled dish and baked just in time to be served hot; send to the table in the skin, as hot as possible, adding a bit of butter, lemon, or salt, as desired. Latundans require 10 minutes, Sabás about 20 minutes, in a hot oven. Do not allow fruit to remain in the skin long after being baked, as the skin causes the fruit to become slightly acrid.

FRIED BANANAS.

Select perfectly ripened Sabás. Allow 1 teaspoon butter for 3 small fruits; fry thin slices until slightly browned, dishing at once. Too long cooking produces a "watery" condition. Lemon juice may be added at the table. Latundans are good fried, but should be cut in thick slices.

BANANAS IN SOUP.

In the West Indies slightly acid bananas similar to our Latundan are sliced and added to soup just at the moment of serving, being especially good in tomato soup.

BOILED BANANAS.

Boil in the skin till soft several Sabás. Peel and add salt, pepper, and butter, and serve as a separate vegetable course.

Boil in the skin till soft several Sabás. Peel, cut in 2-in. lengths, and, at serving, add to a beef-stew, pot-roast, or corned-beef-and-cabbage stew.

BANANA SALAD.

The Lacatan, Bungulan, and Latundan are best for salad purposes. Always prepare with a silver knife, and always scrape from the fruit the fibrous strips of peel that often cling to the fruit. Besides the well-known combinations of bananas and apples, nuts, or celery, sliced bananas are especially good served with chopped figs, dates, or white cherries mixed with the regulation mayonnaise dressing.

The sixth recipe is decidedly novel, and has certainly never been heard of in this State:—

BANANA BUD.

Remove the purple leaf-bracts from the outside of the banana bud (from the tip of the bunch). Boil this white heart about 30 minutes. Cut lengthwise; serve hot with spiced butter sauce, or cold with salad dressing.

The unopened flowers from several buds may be removed from the bracts and cooked, like string beans or mango sprouts.

BANANA PUDDING.

Slice ripe Lacatan or Latundan bananas in a baking dish, adding a tablespoon of water and a teaspoon of sugar for each banana; bake about 20 minutes in a moderate oven. Add well-beaten whites of two or three eggs sweetened with a tablespoonful of sugar. Return to oven for 5 minutes. Serve cold.

BANANA BREAD PUDDING.

In a baking dish place alternate layers of buttered bread and sliced Latundan bananas, adding 3 eggs well beaten with 3 tablespoonfuls white sugar and sufficient milk to cover. Bake 20 minutes in a moderate oven. Good served hot or cold—with a tart jelly or hot chocolate sauce.

LIQUID MANURE.

Anything in the way of animal manure will do to make liquid manure with, and it does not matter whether it be "green" or old. For preference, we ourselves would use a fresh manure. In the new condition its manure value is greater than when it is old and dry. Cow droppings of to-day are ever so much better than those of yesterday or yesterday week.

The object of using liquid manure is to put the plant food in a more or less soluble form. The strength of the liquid should be regulated according to the requirements and size of the plants. If you use horse or cow manure, use the liquid no darker in colour than weak tea. Far better weak than strong. Weak and often is the homœopathists' way. Let it be yours also. Half fill a sugar bag with whatever you intend using, tie it up, and drop it into a cask, letting it soak a day. Never allow the "brew" to remain too long in the cask, in case your neighbour gets to know of it. If possible, always arrange the barrels to the leeward of the man who lives next door. If he be a policeman, put an air-tight or perfume-tight lid on the top. Should an inspector of nuisances live within a block of you, be a little more careful still.

Soot is a particularly good medium for making liquid manure. It contains a small percentage of sulphate of ammonia, and is useful on this account. Put the dry soot into a small bag, and treat it the same as the cow manure.

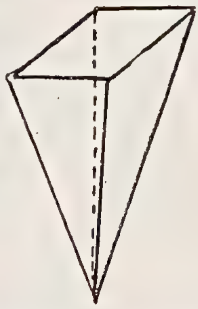
Never give liquid manure to any plant that is dry at the roots. Always water the roses first, and give the stimulant afterwards.

In dealing with pot plants this rule should never be broken. A dose of liquid once a week will do all that is necessary.

The time to begin using liquids is from the beginning of the new growth until the flower buds are just about ready to break. Too much manure and too frequent doses will make everything rather rank. Rather err on the side of too little than give too much.—" Exchange."

USE OF EXPLOSIVES ON THE LAND.

Mr. Charles Lorson, of Russell Island, an expert in the preparation of the land by means of explosives for tree-planting, &c., says that the best implement for making the holes for the dynamite charges is a hexagonal (six-sided) bar of steel about 7 ft. long, costing about 9s. At about 4 in. from the lower end, the point is made four-sided, as shown in the figure, and then properly tempered by an expert blacksmith. The weight of the bar is sufficient to carry the hole down to the required depth for tree-planting (about 2 ft. 6 in.) without the use of a maul. The four sharp edges of the point cut their way and allow of the withdrawal of the bar without difficulty. He uses different kinds of explosives, such as monobel, cheddite, gelignite, rackarock, &c., and always with good results.



TIMES OF SUNRISE AND SUNSET AT BRISBANE—1913.

Date.	January.		February.		March.		April.	
	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	4·57	6·46	5·21	6·42	5·40	6·20	5·57	5·46
2	4·58	6·46	5·22	6·41	5·41	6·19	5·58	5·45
3	4·58	6·46	5·22	6·41	5·42	6·18	5·58	5·44
4	4·59	6·46	5·23	6·40	5·42	6·17	5·59	5·43
5	4·59	6·46	5·24	6·40	5·43	6·16	5·59	5·42
6	5·0	6·47	5·25	6·39	5·44	6·15	6·0	5·41
7	5·1	6·47	5·25	6·38	5·44	6·14	6·0	5·40
8	5·2	6·47	5·26	6·38	5·45	6·13	6·1	5·39
9	5·2	6·47	5·27	6·37	5·45	6·12	6·1	5·38
10	5·3	6·47	5·28	6·36	5·46	6·11	6·2	5·37
11	5·4	6·47	5·28	6·36	5·46	6·10	6·2	5·35
12	5·5	6·47	5·29	6·35	5·47	6·9	6·3	5·34
13	5·5	6·17	5·30	6·34	5·48	6·7	6·3	5·33
14	5·6	6·47	5·30	6·33	5·48	6·6	6·4	5·32
15	5·7	6·47	5·31	6·33	5·49	6·5	6·4	5·31
16	5·8	6·47	5·32	6·32	5·49	6·4	6·5	5·30
17	5·9	6·47	5·33	6·31	5·50	6·3	6·6	5·29
18	5·9	6·47	5·33	6·30	5·50	6·2	6·6	5·29
19	5·10	6·46	5·34	6·29	5·51	6·1	6·7	5·28
20	5·11	6·46	5·35	6·28	5·51	6·0	6·7	5·27
21	5·12	6·46	5·35	6·28	5·52	5·59	6·8	5·26
22	5·12	6·46	5·36	6·27	5·52	5·57	6·8	5·25
23	5·13	6·46	5·37	6·26	5·53	5·56	6·9	5·24
24	5·14	6·45	5·37	6·25	5·53	5·55	6·9	5·23
25	5·15	6·45	5·38	6·24	5·54	5·54	6·10	5·22
26	5·16	6·45	5·38	6·23	5·54	5·53	6·10	5·21
27	5·17	6·44	5·39	6·22	5·55	5·52	6·11	5·20
28	5·17	6·44	5·40	6·21	5·55	5·51	6·12	5·19
29	5·18	6·43	...	...	5·56	5·50	6·12	5·18
30	5·19	6·43	...	...	5·56	5·48	6·13	5·17
31	5·20	6·42	...	...	5·57	5·47	...	...

PHASES OF THE MOON.

			H.	M.
7 Jan.	●	New Moon	8	28 p.m.
16 "	☾	First Quarter	2	2 a.m.
23 "	○	Full Moon	1	40 "
29 "	☽	Last Quarter	5	34 p.m.
6 Feb.	●	New Moon	3	22 p.m.
14 "	☾	First Quarter	6	34 "
21 "	○	Full Moon	12	3 "
28 "	☽	Last Quarter	7	15 a.m.
8 Mar.	●	New Moon	10	22 a.m.
16 "	☾	First Quarter	6	58 "
22 "	○	Full Moon	9	56 p.m.
29 "	☽	Last Quarter	10	58 "
7 Apr.	●	New Moon	3	48 a.m.
14 "	☾	First Quarter	3	39 p.m.
21 "	○	Full Moon	7	33 a.m.
28 "	☽	Last Quarter	4	9 p.m.

Answers to Correspondents.

PRESERVING EGGS.

"ENQUIRER," Sarina—

1. Eggs should be kept in the water-glass solution all the time. The milky colour is most likely caused by a broken egg. At the Agricultural College, solution is in use in which eggs were placed in January, 1912, and kept in it for three to four months. It has remained in the tins until now, and is perfectly clear except for a little sediment at the bottom of the tins. Probably the 1 to 10 strength was too strong; the eggs must be very fresh to sink in that strength. Try 1 lb. of the silicate to 12 lb. of water, and keep the eggs well covered. The liquid should remain quite clear.

2. The best laying strains are between the American and English types, known as the Australian type. Select for breeding purposes a forward cockerel—one that has matured quickly and crows early. This is a sign of a strong constitution.

VINES FOR THE STANTHORPE DISTRICT.

FARMER, Stanthorpe—

It is quite safe to grow vines on their own roots in the Stanthorpe district, as there is no evidence of phylloxera being present. It is only on or near such infested areas that the use of resistance stock is advised. Mr. Ross's next article on viticulture in the journal will deal with the summer treatment of the vines; and articles on propagation, pruning, &c., will appear in due course.

Mr. Charles Lorson, Russell Island, an expert in the use of explosives as an aid to the preparation of the soil for tree-planting, says that, judiciously used, dynamite, gelignite, cheddite, monobel, &c., are all effective.

In any future communication kindly give your name, not for publication unless desired. We do not reply to anonymous communications, but have made an exception in this case.

PRICE OF SISAL HEMP.

J. C., Gladstone—

Prices for sisal have lately been steadily rising. According to Landauer and Co's (London) weekly market report for 6th November, 1912, Mexican sisal is selling at from £36 5s. to £36 15s. per ton; German East African, at £36 15s. to £37 on spot, and £36 to £36 10s. for distant shipment.

Mauritius hemp (Fourcroya) is firm, with a rising tendency. Spot values have advanced to £27 to £27 10s. for good, fair. Several transactions have taken place for forward shipment at prices higher than spot values.

The cost of producing and marketing sisal fibre in Queensland at ruling wages for white workers is from £12 to £13 per ton, so that it is evident that there a profit of over 50 per cent.

Ramie, or China grass, which thrives here like a weed, wherever planted, is worth from £46 to £58 per ton.

See illustrations and notes on your plantation in the December issue of the journal.

Statistics.

COMMONWEALTH METEOROLOGY.

RAINFALL OF QUEENSLAND.

TABLE SHOWING THE TOTAL RAINFALL FOR EACH MONTH OF THE YEAR IN THE AGRICULTURAL DISTRICTS OF QUEENSLAND.

STATIONS.	1911.		1912.										
	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
North.													
Ayr	...	...	...	...	3·53	1·16	1·01	6·70	...	...	Nil	·46	1·51
Bowen	0·19	1·32	1·56	3·15	1·86	0·59	1·76	3·78	...	0·18	Nil	2·46	1·00
Cairns	1·95	0·90	4·81	16·68	5·95	4·71	5·97	8·00	...	2·89	0·75	2·25	1·54
Geraldton (Innisfail)...	1·61	0·75	5·50	18·24	6·01	56·14	41·84	15·25	..	3·39	2·65	1·58	2·40
Gindie State Farm ...	...	3.50	0·68	2·59	1·88	0·63	...	9·94	3·45	...	Nil	1·54	2·17
Herberton	0·62	5·36	5·29	2·82	1·47	1·40	2·20	2·36	...	1·30	0·53	·78	1·37
Hughenden	1·37	0·69	5·78	1·84	3·52	Nil	0·74	6·64	...	Nil	0·13	Nil	2·29
Kamerunga State Nurs.	...	...	...	...	...	*	...	...	...	...	...	...	...
Mackay	0·17	0·41	2·08	8·04	·93	3·56	3·42	5·51	...	0·23	0·2	7·28	3·03
Mossman	0·86	3·31	6·06	18·32	17·60	6·40	2·78	8·88	1·33	1·98	1·80	5·49	6·88
Rockhampton	0·6	0·81	2·50	3·24	·14	0·01	1·98	8·38	...	Nil	Nil	6·87	1·45
Townsville	0·31	2·84	1·64	7·57	6·35	4·51	0·63	4·49	...	0·17	Nil	·64	2·69
South.													
Brisbane	0·84	1·94	1·85	2·13	1·03	0·72	0·20	7·22	...	1·32	0·43	5·85	3·69
Sandgate	...	..	...	...	...	...	...	...	...	...	...	...	4·25
Bundaberg	1·30	2·98	3·96	2·47	...	Nil	1·33	10·23	1·76	0·78	0·22	3·74	3·14
Bungeworgorai (Roma State Farm)	...	...	0·73	...	2·19	Nil	...	7·06	...	0·33	0·22	1·96	2·20
Crohamhurst	1·74	3·02	5·62	8·72	13·73	1·77	1·39	9·99	1·67	1·35	0·19	6·66	...
Dalby	1·99	1·55	1·76	2·58	·53	Nil	Nil	4·76	...	0·68	0·87	3·36	1·98
Esk	0·47	0·44	1·38	8·26	·22	0·36	0·11	7·43	...	1·13	0·52	2·57	3·80
Gatton Agric. College	0·49	1·90	3·56	3·31	7·86	1·35	...	6·63	1·84	1·04	0·53	4·99	2·59
Glasshouse Mountains	1·76	1·44	3·37	6·99	13·15	0·31	0·98	7·85	1·86	1·14	0·8	6·60	4·38
Gympie	0·50	2·10	2·92	4·47	·15	0·37	0·52	2·63	...	0·92	Nil	2·94	2·28
Ipswich	0·25	...	1·87	3·00	·41	0·30	Nil	3·93	...	1·02	0·49	4·04	3·34
Maryborough	0·90	4·98	2·39	3·93	·11	0·32	1·09	9·12	...	1·26	Nil	5·54	4·07
Roma	1·55	1·19	0·74	0·76	·85	0·03	Nil	7·96	...	0·77	0·28	1·95	2·81
Tewantin	1·14	2·13	5·60	4·25	·85	0·80	8·46	8·72	...	0·82	Nil	6·02	4·68
Toowoomba	...	...	...	...	·52	0·66	0·16	6·75	...	1·05	1·08	5·41	2·05
Warren State Farm ...	...	...	0·82	1·75	2·04	0·22	1·28	9·51	3·35	...	...	...	...
Warwick	2·26	0·70	1·57	3·45	·56	0·02	0·9	5·69	...	1·37	1·50	3·75	2·65
Woodford	...	...	...	...	...	...	...	9·78	...	...	0·53	6·78	2·52
Yandina	1·36	1·87	5·95	4·84	·95	0·88	1·39	7·42	...	1·25	0·18	5·7	...

NOTE.—The rainfall data in this table are compiled from telegraphic reports, and must be considered as approximate only. * No Report.

GEORGE G. BOND,
Divisional Officer.

The Markets.

PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR DECEMBER, 1912.

Article.		DECEMBER. Prices.
Bacon, Pineapple	lb.	9d. to 10½d.
Bran	ton	£6 15s.
Butter	cwt.	104s.
Chaff, Mixed	ton	£3 to £5
Chaff, Lucerne	"	£3 3s. to £3 15s.
Chaff, Oaten (Victorian)	"	£5 to £6 10s.
Chaff, Oaten (Local)	"	£6
Chaff, Wheaten	"	...
Cheese	lb.	6d. to 7d.
Flour	ton	£10
Hay, Oaten (Victorian)	"	£7 15s.
Hay, Lucerne	"	£2 10s.
Honey	lb.	2½d. to 2¾d.
Maize	bush.	4s. to 4s. 1d.
Oats	"	3s. 9d. to 4s. 1d.
Pollard	ton	£7 10s.
Potatoes	"	£8 to £12 10s.
Potatoes, Sweet	cwt.	4s. to 5s.
Pumpkins	ton	£6 to £7
Wheat, Milling	bush.	3s. 9d. to 4s. 2d.
Onions	ton	£6 to £8
Hams	lb.	1s. 1½d.
Eggs	doz.	8d. to 1s.
Fowls	pair	3s. to 5s. 6d.
Geese	"	8s. to 8s. 3d.
Ducks, English	"	3s. 6d. to 4s.
Ducks, Muscovy	"	5s. to 6s.
Turkeys (Hens)	"	7s. 6d. to 10s.
Turkeys (Gobblers)	"	12s. 6d. to 22s.

SOUTHERN FRUIT MARKETS.

Apples (Choice), per bushel case	10s. to 20s.
Apples (Cooking), per bushel case	5s. to 10s.
Apricots, per quarter-case	3s. 6d. to 10s.
Bananas (Fiji), G.M., per bunch	4s. to 16s.
Bananas (Fiji), G.M., per case	9s. to 19s. 6d.
Bananas (Queensland), per bunch	2s. to 6s.
Bananas (Queensland) per case	14s. to 16s.
Cherries, per 12-lb. box	3s. 6d. to 7s.
Cocoanuts, per dozen	2s. 6d. to 3s.
Custard Apples, per quarter-case	...
Gooseberries, per quarter-case	5s. to 6s. 6d.
Lemons (local), per gin case	9s. to 16s.
Lemons (Italian), per case	8s. to 14s.
Mandarins (Emperors), per case	8s. to 14s.
Oranges (Navel), per gin case	— to 30s.
Oranges (other), per case	14s. to 20s.
Papaw Apples, per quarter-case	1s. 6d. to 3s.
Passion Fruit, per half-case	4s. to 10s.
Peaches, per half-case	4s. to 12s.
Peanuts, per lb.	5d.

SOUTHERN FRUIT MARKETS—*continued.*

Article.	DECEMBER. Prices.
Pineapples (Queensland), common, per case	5s. to 12s.
Pineapples (Queensland), Ripley's, per case	6s. to 12s.
Pineapples (Queensland), Queen's, per case	5s. to 16s.
Rockmelons (Queensland), per half-case	4s. to 6s.
Tomatoes, per half-case	1s. to 5s. 6d.
Watermelons (Queensland), per crate	30s. to £2
Cucumbers (Local), per bushel case	2s. 6d. to 4s.

PRICES OF FRUIT—TURBOT STREET MARKETS.

Article.	DECEMBER. Prices.
Apples (Eating), per case	10s. to 18s.
Apples (Cooking), per case	7s. 6d. to 9s.
Bananas (Cavendish), per dozen	2½d. to 3½d.
Bananas (Sugar), per dozen	2d. to 2½d.
Cape Gooseberries, per case	4s. to 8s.
Cherries, per quarter-case	6s. to 8s. 6d.
Citrons, per cwt.	...
Custard Apples, per quarter-case	...
Lemons, per case	10s. to 12s.
Mandarins, per case	5s. to 8s.
Mangoes, per case	2s. 6d. to 3s. 9d.
Oranges (Navel), per case	6s. 6d. to 12s. 6d.
Oranges (Other), per case	4s. 6d. to 6s.
Papaw Apples, per quarter-case	2s. to 2s. 3d.
Passion Fruit, per quarter case	5s. to 6s.
Peaches, per case	1s. to 3s. 6d.
Peanuts, per lb.	2½d. to 3½d.
Pineapples (Ripley), per dozen	5s. to 10s.
Pineapples (Rough), per dozen	1s. 9d. to 6s. 6d.
Pineapples (Smooth), per dozen	6s. to 7s.
Rockmelons, per doz.	7s. to 12s.
Strawberries, per tray	1s. 6d. to 2s. 3d.
Tomatoes, per quarter-case	2s. to 4s. 9d.
Watermelons, per dozen	4s. 6d. to 12s. 6d.

TOP PRICES, ENOGGERA YARDS, NOVEMBER, 1912.

Animal.	NOVEMBER. Prices.
Bullocks	£9 15s. to £12 7s. 6d.
Cows	£6 15s. to £8 10s.
Merino Wethers	20s. 9d.
Crossbred Wethers	25s. 9d.
Merino Ewes	18s.
Crossbred Ewes	17s. 3d.
Lambs	15s. 9d.
Pigs (Porkers)	29s.

Farm and Garden Notes for February.

FIELD.—The land intended for potatoes should now be ready for planting. Plant sound small potatoes, well shot, without cutting them. If large potatoes are cut into setts, there is a risk of their rotting, as the usual wet weather may be expected, with a hot, muggy atmosphere. Weeds will be very troublesome, and for that reason the sowing of lucerne should be deferred till later. Sow lucerne in deep rich soil, thoroughly worked and deeply ploughed. Cape barley, panicum, kafir corn, imphee, sorghum, and vetches may be sown; but it is risky to plant maize for a late crop, as early frosts would destroy the ripening grain. For an early winter crop, sow swede turnips and mangelwurtzels.

KITCHEN GARDEN.—Make preparations for good crops of vegetables for the early winter by ploughing or digging all unoccupied land, supplying well-rotted manure if needed. Chicken guano is also an excellent fertiliser, if prepared as follows:—

Spread a layer of black soil on the ground. Dump the fowl manure on to this, and pound it fine with the back of a spade; add hardwood ashes, so that the compound shall contain—Soil, 3 bushels; fowl manure, 2 bushels; ashes, 1 bushel. Mix thoroughly, and a little before planting moisten the heap with water, or, better still, with urine; cover with old mats, and let it lie till needed.

Most market gardeners will have cabbages and cauliflowers ready for transplanting. Do this during the month. In the pamphlet on "Market Gardening" issued by the Department, it is recommended to sow the seed from the middle of January to the middle of March, arranging the time, however, to suit early and late districts. For winter crops, the Drumhead type, of which Flat Dutch and Queensland or Florida Headen are good examples, and are the most profitable. The Savoy cabbage does well here. The best cauliflowers to grow are the Large Asiatic, Eclipse, Early Dwarf, and Le Normand. If the aphis appears, spray with tobacco solution.

Sow French beans, butter beans, beet, carrot, turnip, radish, cabbage, cauliflower, cress, peas. Should the weather prove dry after the January rains, give the plants a good soaking with water. Gather all fruit of cucumbers, melons, French and other beans, and tomatoes as they ripen, to ensure the continued production of the vines and plants.

FLOWER GARDEN.—Thin out and tie up dahlias. Keep the weeds down, and never allow them to seed. Sow hardy annuals. This is the best month for sowing, as you will be able to keep up a succession of bloom during the succeeding months of autumn and winter. To ensure this, sow phlox, pansy, daisy, stocks, aster, nasturtium, hollyhock, candytuft, mignonette, sweet peas, dianthus, carnations, cornflower, summer chrysanthemum, verbenas, petunias, pentstamons, &c. Dianthus, sown now and planted out in March, will bloom during the whole year, if the dead stalks and blooms are regularly cut away.

Do not sow flower seeds too deep, as on the depth will depend greatly what results you will have as regards the seed germinating. It is easy to remember that seeds should be covered with fine soil to a depth equal to their own size; for instance, a pea is about one-eighth of an inch in diameter, therefore, cover it with one-eighth of an inch of soil.

Orchard Notes for February.

In order that the series of monthly notes that have appeared for some years past in the "Agricultural Journal" might be rendered of more value to our fruit-growers, I took advantage of the commencement of the new year to revise them and bring them up to date. At the same time, I somewhat altered the notes, as, instead of making them of a general nature, applicable to the whole of the State, I endeavoured to localise them to a certain extent, as, in my opinion, although the general principles of cultivation, manuring, pruning, treatment of fruit pests, as well as of the handling and marketing of the fruit are applicable to the State as a whole, there are many matters that are of interest to individual parts of the State rather than to the whole State; and, further, notes that are applicable to the Southern part of the State for one month are not always applicable to the North for the same month.

In order to carry out this idea I divided the State as follows:—

1. The Southern Coast Districts, south of the Tropic of Capricorn;
2. The Tropical Coast Districts;
3. The Southern and Central Tablelands.

This plan has met with such general approval during the past year that the notes will henceforth be published in accordance therewith.

THE SOUTHERN COAST DISTRICTS.

The earlier summer fruits, including grapes, will be pretty well over, but pineapples, mangoes, and bananas are in full fruit. The bulk of the main summer crop of pines ripens during the month, and growers are in consequence kept very busy sending them to both our local markets and canneries, and to the Southern States. The planting of all kinds of tropical fruits can be continued where necessary, though earlier planting of both pines and bananas is to be recommended. Still, if the land is thoroughly prepared—viz., well and deeply worked—they can be planted with safety, and will become well established before winter. The month is usually a wet one, and both tree and weed growth is excessive. If unable to get on the land with horses to keep down weed growth, use the sythe freely in the orchard before weeds seed, as by doing so you will form a good mulch that will tend to prevent the soil washing, and that when ploughed in later on will add a considerable quantity of organic matter to the soil, thus tending to improve its mechanical condition, its power of absorbing and retaining moisture, as well as to increase its nitrogen contents.

This is the best month of the year in which to bud mangoes in the Brisbane district. The bark of the stock to be budded must run very freely, and the scion, when placed in position, must be tied very firmly. The bark of the scion should be slightly thicker than the bark of the stock, so that the material used to tie it keeps it firmly in its place. As soon as the bud is tied ringbark the stock just above the bud, so as to force the sap of the stock into scion so that a union will take place quickly.

Where cyaniding of citrus and other trees has not been concluded it may be continued during the month, as fruit treated now will probably keep clean and free from scale insects till gathered. If the trees have been treated with Bordeaux mixture, do not cyanide, as cyaniding should always be done previous to spraying with Bordeaux mixture.

If Maori is showing, spray with the sulphide of soda wash. Look out for Black Brand and also for the Yellow Peach Moth towards the end of

the month in the earlier districts. Spraying with Bordeaux mixture is advisable in the case of both of these pests.

Get land ready for strawberry planting, so as to be ready to set out runners next month. Some growers set out plants as early as the end of February, but I prefer March. Citrus and deciduous trees can still be budded during the month. Young trees in nursery should be kept clean and attended to; ties should be cut where necessary, and the young trees trained to a straight single stem.

THE TROPICAL COAST DISTRICTS.

As the month is usually a very wet one in this part of the State, very little work can be done in the orchard other than keeping down excessive weed growth by means of a scythe. When citrus trees are making excessive growth and throwing out large numbers of water-shoots, the latter should be cut away, otherwise they are apt to rob the rest of the tree, and thus injure it considerably. Many of the citrus trees will come into a second blossoming during the month, and this will produce a crop of fruit ripening towards the end of winter and during the following spring. The main crop, where same has set in spring, will be ripening towards the end of the month, but as a rule insect life of all kinds is so prevalent at this time of year that the bulk of the fruit is destroyed. Where there is sound fruit, however, it will pay to look after. If the weather is wet it should be artificially dried before packing, but if there are periods of sunshine, then the fruit can be cut and laid out on boards or slabs in the sun, so that the extra moisture of the skin can be dried out. Care will have to be taken not to sun-scald the fruit, or to dry it too much; all that is required is to evaporate the surplus moisture from the skin, so that the fruit will not speck when packed.

Tropical fruits of all sorts can be planted during the month. Budding of mangoes and other fruits can be continued. Bananas must be kept netted, as fly is always bad at this time of year.

THE SOUTHERN AND CENTRAL TABLELANDS.

The marketing of later varieties of apples, pears, plums, peaches, and nectarines will occupy the attention of the Stanthorpe growers. The grape harvest will also extend right through the month. Every care should be taken to see that the fruit fly and codling moth are not allowed to spread, although the best work in fighting these pests has to be done during the months of December and January, as on the action then taken, if carried out systematically, the freedom of the later fruits from infestation mainly depends.

Handle the fruit carefully, and see that no fly or codling moth infested fruit leaves the district. The grapes, ripening as they do when this fruit is over in the earlier parts of the State, should be sent not only to Brisbane but to all other parts of the State. For long shipment nothing can beat crates holding 6-lb. baskets. The fruit should be gathered some hours before packing, and be placed in the sun, so as to become thoroughly dry, and to allow the stems to become wilted, as this causes the fruit to hang on the bunch much better, and consequently to reach its destination in better order.

If parrots and flying foxes are troublesome, organised shooting parties or poisoning with strychnine are the best means of dealing with those pests.

The crop of grapes will be about over in the Roma and other inland districts. Citrus trees, when infested by Red Scale, should be cyanided. The orchard should be kept well cultivated after every rain, and when there is no rain, but water is available for irrigation, if the soil requires it, the trees should get a good soaking, which, if followed by thorough cultivation, will carry the trees on till the fruit is ripe.

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Agriculture.

RAILWAYS AND FARMING.

SOME INFLUENCES AFFECTING THE PROGRESS OF AGRICULTURE.

Such is the title of a most interesting Bulletin (No. 100), issued last October by the Bureau of Statistics of the United States Department of Agriculture. There is much in this publication which may be applied to the relations between railways and agriculture in Queensland, although railways in this State are built, owned, and worked by the Government, whilst those of the United States are owned by private companies. We take from it the following extracts, which seem to be of interest to the farmers, pastoralists, miners, and others engaged in the primary industries of Queensland:—

"The most prominent of all classes of occupation which have aided agriculture is that of transportation. The railroad companies are now making, and for a number of years have made, special efforts, apart from their strictly transportation business, to promote agriculture." This has, of late years, been the aim of the Queensland Government, and it is this which has been the prime factor in the determination arrived at some time ago to extend our railways as rapidly as possible into the agricultural, pastoral, mining, and timber districts of the State. The adoption of the 3 ft. 6 in. gauge throughout our railway system has much facilitated this important work, especially in the

matters of cost of construction and of rolling-stock. Then, as to the revenue resulting from the running of trains in the districts indicated, the Bulletin says: "The railroad companies have had at least two strong motives to promote agriculture. One motive has been, and is, the large percentage of the revenue which is due to the farm. During the year ending 30th June, 1910, the revenue from four classes of farm products—grain, hay, cotton, and live stock—amounted to 97,000,000 dollars (£19,400,000) on those roads for which reports on this subject were made to the Interstate Commerce Commission; they operated more than half the mileage of the United States, and carried about one-half of the total tonnage. With the data for these companies as a basis, it is estimated that 10 per cent. of the total freight revenue of the railroads of the United States was derived from carrying grain, hay, cotton, and live stock. A second reason why railroad companies have been willing to spend money to encourage agriculture has been the fact that they had for sale large areas of land. . . . The total area of public land granted by Acts of Congress for railroad purposes up to 30th June, 1911, was 115,500,000 acres, which is equal to more than the total land area of the seven Atlantic States, from New York to Virginia, inclusive. One railroad was granted 33,300,000 acres. Another company had received 19,100,000 acres up to the date just mentioned." The average price at which these lands were sold by one company was 2·17 dollars (about 9s.) per acre, 349,961 acres being sold. Another company sold a large area of land (80,464 acres) at an average price of 3·75 dollars (15s. 7d.) per acre. These railway companies in the United States do not pose as philanthropists. They are after the almighty dollar, and that dollar they found was to be obtained, not so much out of the land sales, but out of the freight charges on the produce of the land. They laid themselves out to induce settlement, considering their operations as a business proposition. The more farmers along a road, the more tonnage; the farm products were to be hauled away and the farmers' supplies brought to them. The better the methods of agriculture, the greater the increase in the freight traffic. With this in view, the railway companies set themselves to educate the farmers. Each company established an agricultural department, about 70 per cent. of them engaging in promoting agricultural education by means of an organised corps of experts to supervise experiments and give advice to farmers, by publishing and distributing pamphlets on rural subjects and by operating numerous "instruction trains," which traverse the agricultural centres through which the railway lines pass, stopping at various villages, and by means of carloads of exhibits in charge of professors of various branches of rural industries, bringing agricultural education to the farmers' doors. The entire number of farms in counties subject to the agricultural promotion work of railroads is over 6,000,000—that is to say, that only 5 per cent. of the individual farms of the United States in 1911-12 were not located, at least, nominally, within reach of the immigration or educational efforts of railroad companies in behalf of agriculture. The terms on which land was sold by the companies to settlers during the construction of the Northern Pacific Railroad were:

Ten per cent. of the selling price in cash, 10 per cent. in one year, and an equal amount for the second and third years; for the next four years, 15 per cent. each year; thus giving the new settler seven years in which to pay for his land. The interest on his deferred payments was 7 per cent. per annum. When necessary, the company erected houses for the settlers, and "reception houses" were built for the accommodation of newly-arrived settlers. Tools, seeds, fencing, and other supplies were provided for the pioneers on "terms just to both parties," while nurseries and forests were to be established. Home-seekers' excursions at low rates enable the purchaser to spend a few weeks in a given territory and to stop over at such points as may interest him. Not only are low passenger-fares offered to encourage new settlers, but also favourable freight rates. For instance, the household goods and farming implements of settlers are regularly classed as subject to lower rates than are other or unused implements and furniture.

Reverting to the "instruction trains." The lecturers accompanying such trains are usually members of the faculty of a State Agricultural College, or experts from a State Experiment Station or the United States Department of Agriculture. The railroad company provides the train, usually at no charge at all; plans, or helps to plan, the itinerary, and by advertising and Press notices helps to attract people to the various railway stations, where lectures are given and where opportunity is afforded to look at the exhibits in a train. The topics discussed by these train lecturers relate to the many phases of agriculture. Among the subjects common to the lectures are dairying, marketing, and domestic economy. In the North Central States, the topics include grain, bacon production, and silos. In the Middle Atlantic States, alfalfa (lucerne), and potatoes have prominence. South of the Ohio and Potomac Rivers, lectures are given on truck-growing (market-gardening), diversified farming, good roads, and the cotton boll weevil. In the South-west, market-gardening, cotton, live stock, fruitgrowing, and dairying are discussed from the train; while in the Rocky Mountain and Pacific Coast regions, some of the topics are fruitgrowing, rotation of crops, conservation of moisture, and chemistry of the soil. The length of the instruction trip varies from a few days to several months, and the trains make from two to nine or more stops in one day. One such train, during a seven months' trip, covered 8,905 miles in 70 days, and provided for 597 meetings, which were attended by 147,748 persons. Another covered 3,436 miles in 68 days, stopping for 223 meetings, at which the attendance was reported to be 73,663. Still another itinerary included 39 stops in six days, lectures being given to 9,720 persons.

The railroad agricultural expert visits from farm to farm. One of them visited 400 farms in one year in response to invitations. Another of the expert's duties is to conduct a demonstration farm. The demonstration farms are also established by the railroad companies. Plots on private farms are also used by the companies as a means of agricultural education. The farmer is paid for the use of an acre, and is furnished with seed and, if needed, with some special implement, such as a subsoil plough, and whatever crop is raised is given to him. All he

PLATE 8.—TAKING THE COLLEGE TO THE FARM. AN INSTRUCTION TRAIN.

has to do in return is to follow the directions given by the railroad representative.

The next movement by the railroad companies was to employ men experienced in produce marketing, and to send them among the farmers in its territory to give advice as to where and how to sell produce, and in 1912 a quick-transportation service was offered to all shippers. This proved a marked success, as also did selling straight from the cars on arrival at their destination. The subsequent establishment of market houses at a number of towns along the company's line, however, for the use of producers, was abandoned after a few months' trial.

We have here shortly discussed the leading phases of the work of agricultural promotion on the part of American railway companies. There are many others, all tending to the expansion and improvement of the agricultural industry, and showing how a national work can be carried out, not by a philanthropic association, but by a hard, business-like combine intent on making big dividends, yet, in so doing, pushing the country ahead, settling the hitherto uninhabitable spaces, and increasing the wealth of the country by millions of dollars. Can it be wondered at that the United States of America are head and shoulders above other countries from an agricultural point of view, notwithstanding the fact that this wonderful expansion is due mainly to the work of private land-grant railway syndicates? We will now take the position of the rural industries of Queensland, and the means adopted for their expansion, in comparison with the same industries in the United States. It should be noted, as somewhat remarkable, that no mention is made, in the reports of the work of the railway companies of America, of any efforts made towards the expansion of the wool or mining industries, which, nevertheless, are of very great importance in that country.

[TO BE CONTINUED.]

THOUGHTS FOR THE NEW YEAR.

THE FARM HOME.

Many farmers from the British Isles, from Germany, Denmark, France, and other European countries, who have settled in this State, and who celebrated Christmas of 1912 and the New Year, doubtless allowed their thoughts to travel to their old homes in their native land in the rural districts, and recalled to memory those two seasons, when their families, relations, and friends united in celebrating them according to old traditional custom. There is no more enjoyable home life than that of the dweller on the land, and most of us recall with regret the happy days of our youth, particularly at those festive seasons.

The festive season of Christmas, and of the dawning New Year, lead us to think of the happy homes in the old country in the rural districts of the British Isles, and also of the home life of the German and French agriculturists, who make these two seasons a time of enjoyment and of the reunion of families. There is no more enjoyable home life than that

of the dweller on the land, and we recall with a longing regret the happy days of our youth, particularly at this season. It is owing to these recollections that we reprint a very excellent paper read by a former Under Secretary of the Department of Agriculture, Mr. P. McLean, at a session of the Agricultural Conference at Bundaberg, in May, 1891. Mr. McLean said—

"There are no words in our language which call up more tender and hallowed associations than the three little words—'Father,' 'Mother,' 'Home.' Nor can they be dissociated. Where father and mother are—there is home. The word 'home' awakens in the bosom of every individual many tender and hallowed associations. What deeply-cherished memories hover around that word! And there is no home on earth of which the heart cherishes sweeter memories than the 'Farm Home.' Dryden says, 'Home is the refuge of the soul.' In palace and cottage it is alike dear; in the luxuriously-furnished apartments of the rich, in the scantily-provided dwelling of the poor it is alike cherished.

"But the question we are dealing with at present is not an abstract one; it is a practical one. My object is not simply to recall to your mind the home in which you were reared, or to the farm home in the general acceptation of the word, but to our Queensland farm home; and, take them as a whole, or even a majority of them, are they what they should be or could be? If we find that the farm home of this State is not what it should be or could be, then I think we are on the fair way to the solution of a problem that is of the utmost interest to us as a people and a country.

"Now, what is this problem? It is a very serious one, and one on which our weal and welfare to a large extent depends. Why is it that nearly all the boys and girls born on our farms are so eager to leave the parental roof—the home of their youth—and rush into our cities to follow any occupation rather than that in which the parents are engaged? I believe it is to be accounted for, to a very large extent, upon the grounds that the farm home is not what it should or could be.

"Home may be the largest as well as the most pleasant part of earth if we make it such, and this is what our farm homes should be if we wish our boys and girls to stand by the old spot and its surroundings. There is no one who possesses as many opportunities and advantages for making home delightful, pleasant, and happy as the man who lives in the country. And where on earth can this be done to greater advantage and more easily than in this sunny south land of ours—a pure, clear atmosphere; a soil that yields its fruits and flowers with little trouble or exertion? In no land can the farm home be made more pleasant and attractive than in this, and yet the great majority of our boys and girls appear, by their actions, to consider they are wasting their lives because their lives are not passed in pleasanter places. They are fretful and discontented and take the first opportunity of casting off the burdensome and, to them, disagreeable duties, and rush to our large cities, where they think a pleasanter and more profitable life awaits them.

" I am inclined to think that the want of interest shown by a large number of our farmers in not making their homes more pleasant and attractive to the children may be accounted for by the object a great many people had in view in leaving the old land and coming to the new.

" These Australian colonies attracted little or no attention until gold was discovered. When this discovery was made, the people in distant lands heard of the great richness of the goldfields of Australia. They flocked to these shores with but one aim, one object—to get rich as soon as possible, and return again to the land of their nativity. They were willing to submit to a great many privations, to endure great hardships, if they could only accumulate wealth and return again to the old land and enjoy it at leisure. People did not come here with the firmly-fixed intention of building up for themselves and their families such homes as the children would revere, and around which their happiest associations would cling. Finding that gold was not to be picked up from the street, and all who laboured on the diggings did not amass riches, many turned their attention to the land as the next best thing from which to make a fortune. These men never intended to make a farm home. They were content to suffer all the hardships and inconveniences of the digger's tent or hut for the short time they intended remaining on the land. They complied with the conditions demanded by the land laws; brought their land into a state of semi-cultivation; secured their title deeds, and sold out at the first opportunity. Their sons and daughters saw none of the pleasures of the true farm home; consequently they turned their attention to something else rather than endure a similar life to that of their parents.

" Men in every business, profession, and occupation, think that the chief end and main object of living is to accumulate riches. Many of our farmers are of this class. It is, no doubt, a very laudable aim on the part of any man to place himself and family above being dependent on the cold charity of the world. But there are other things to live for besides gold, and there are other things that make a man far wealthier than all the gold of Australia. There are farmers—and I know some of them—who scrape together every penny they can scrape, and place it in the bank or else invest it in city property. Their land is rich; it yields abundantly; the soil is well tilled; there are numbers of horses and implements to work the land; but there is no shed in which to place the implements when the season's service is over. There is a poor apology for a stable on some farms, and on some there is none. And when we come to the home, alas for the influence it is likely to exert on the boys and girls reared there! Look inside, it is scantily furnished; the walls are bare; there is nothing to attract the attention; nothing to excite the imagination, or around which the young heart's tender affections might cling. There are no flowers in the garden, consequently there can be none in the house. There is no fruit on the trees, because the trees are not there. It is in the home where the farmer's sons and daughters receive their first impressions of farm life, and how important it is that these first impressions should be of the right character.

Impressions made on the young mind endure through life. Boys and girls soon learn to make comparisons, and if in visiting a town house they find it has more attractions and comforts than a farm home, it is quite likely a dislike for farm life will be created, especially among the boys, as is too often the case at the present day, and home will not present sufficient attractions or inducement to prevent them from leaving it, perhaps, for ever. If the farm home and environment were made more what they should be and could be—pleasant, inviting, convenient, and attractive—we would find the boys clinging to the soil, and the daughters willing to take upon themselves the duties of making some other country home a place of joy and happiness.

"How often do we find that as the farmer rears a family of boys, one after the other as they grow up leave him in his old age to struggle on alone and unaided—not one willing to remain on the farm; not one beaming countenance is seen alongside the inglenook. The boys have no inducement to remain. It is work, work, toil, toil from early morn till dewy eve—one continual grind; no rest, no recreation. The old man is so anxious to accumulate riches that he neither finds time for recreation for himself nor for his family. The experience of many of our boys as they look back on their early life will be that of Professor Seely, of Middlebury College. His recollection of farm life in his youth was principally that of feeling tired, tired, tired, when night came. Farm life is made too hard; it needs something to lighten it and make it enjoyable, as it should and might be.

"If we wish our children to be happy and take an interest in the farm home, we must make the farm home bright and show them the bright side of life—for there is a bright side to be enjoyed in every true home. If we do not find attractions for the children at home they will find them for themselves away from home, and often in an atmosphere that is anything but conducive to their present or future happiness and prosperity. Improve and beautify the farm home; make it the abode of contentment and joy, and not a mere stopping place for the night. If you make your home an educational institution you will make it attractive. Have good, entertaining books for the children to read. Be sure and have one or two more newspapers or periodicals dealing with the practice and science of agriculture on the table. We should not only be up to the times ourselves, but we should place such facilities and opportunities for instruction in the reach of our young men and women that they may keep abreast of the times, so as to be ready to lay hold of the most advanced development of the occupation in which they are at present engaged and in which you wish them to remain.

"It is not to be expected that all our farmers' boys will follow the paternal occupation. This is expecting too much; yet we should have it rendered so pleasant and inviting that none would hesitate to engage in it on that account at least. We should at least try to create in the minds of our young men an interest in agricultural pursuits. This interest should be watched and encouraged. You must remember that this is an age of progress and improvement. Old habits and customs are

passing away; new ones take their place. Old modes of farming operations are being swept away by the advancement of intelligence and science. Henceforth, farming is not to be conducted by physical force alone. The inventive mind comes to the aid of the toiling hand, and there is a respite from the dull monotony of labour that in many instances is but little elevated above that of the horse in the collar or the bullock in the yoke. It is, no doubt, an established truth that men and women must toil with the hand; but that labour should be intelligent, and in this age of invention can be mitigated and facilitated by those appliances called into operation by the inventive mind. As the farmer avails himself of these appliances, he secures results that cannot be accomplished by physical force alone. He elevates agriculture in the minds of his children, makes farm life less laborious, and renders the occupation more respected and attractive.

"Where is the true-hearted father who does not desire to see his boys enter upon some useful and remunerative sphere of life? And what more pleasant, useful, and healthy occupation can a boy follow than that of the farm? Nay, in these days of what is called 'organised labour,' it is not a matter of choice what occupation a boy shall enter, but what occupation he shall be allowed to take up. Several of the workmen who gave evidence before the Labour Commission now sitting in Brisbane (May, 1891) emphatically stated that there were too many apprentices at the trade, the result of which was to reduce wages. One man—a compositor—is reported to have said that he believed that the only method of limiting the employment of boys was by legislation. This excessive employment of boys was the great grievance of the trade, and he believed that a large proportion of the boys now learning the business would never find employment at it. There were some offices in Brisbane that were really manufactories of printers. So that, in view of the attitude of organised labour, it becomes an imperative duty on the part of the farmer to surround his family with an atmosphere of such an attractive character as will stimulate a desire in the young mind to follow agriculture, the basis of the happiness of the world. It is the most honourable, as well as the most ancient and the most healthy of occupations.

"There is another question associated with the settlement of our boys that is worthy of paternal consideration. Will young men find it easier and surer to obtain a comfortable competency by entering into trade, or one of the professions, than by remaining on the farm. Those people who think farming a poor, mean business for a young man to engage in have often narrow and mistaken ideas on the subject. It is true, as compared with the successful manufacturer, merchant, banker, lawyer, doctor, or clergyman, the profits look less. To make money by the products of the soil, the process is slow and often laborious. But every man cannot be a successful manufacturer or merchant. The opportunities of rising to the position of bank manager are few. The legal profession is crowded out, and many of those now carrying an empty brief bag would willingly change places with the farmer if they

could. The number of medical men is far in advance of the requirements of even the most unhealthy countries; and as for the clergy, there are hundreds of them who have never heard, nor are they likely to hear, a call whispered in their ear. It is true of the farmer as of other occupations, everyone cannot climb to the top of the tree, everyone may not be able to die rich, but all may live and die in comfortable circumstances.

"I fear that many of our farmers fail to realise what constitutes true wealth on the farm. They think that they are rich only if they have a good credit balance at the bank; they forget that every pound wisely and judiciously spent on the farm is placing so much to their credit. When the slab hut with its earthen floor gives place to the comfortable framed house lined and ceiled, a few pictures are hung upon the walls, a bookcase is filled with entertaining and instructive books, the cheery fireside around which the boys and girls can gather when the day's work is over—thus creating in the young mind a sense of comfort and contentment—is not the comfort and contentment of the children a credit balance? Where a few pounds are spent in providing improved implements and appliances—implements that will lighten the labour on the farm, and appliances in the home and dairy that will lighten the labour of the wife and daughters—is there not a credit balance there? And a few more pounds spent, and to which a little labour can be added, in providing housing for cattle and implements—is there not a credit balance there? I know that every pound spent on my farm in improvements, implements, and appliances, I looked upon as so much money placed to my credit in the bank. In addition to which I had the consciousness of knowing that I was making my family happy and comfortable, and also the satisfaction of knowing that my cattle were also comfortable and my implements secured from the weather. Every pound spent on the farm is a solid investment; it increases its value; it makes it more interesting to those engaged in it; it is the safest stock any man can invest in; and, though it may not return as large interest as bank shares, the farmer is creating wealth of a more permanent character than he can do by the fluctuating chances of the Stock Exchange.

"There is another aspect of this question that is well worth referring to, and which I can do most *apropos* at the present time, and I cannot express it better than by quoting the words of a gentleman, a member of the State Board of Agriculture, in the State of Massachusetts. In addressing a meeting similar to this, he says—'The man who owns his homestead not only enjoys a higher social position, and has greater opportunities for sharing in the good things of life, but he has an additional incentive for being a good citizen. He realises more clearly that he has an interest in the country, that he is a more important factor in the body politic. His position as a taxpayer, while it imposes a burden, adds to his sense of dignity and self-respect. He feels more keenly the necessity for good government, for economy in public expenditure. "Only those who have nothing to lose ever revolt," says Holyoake. A man who has something to lose through disorder

and tumult is under the strongest bonds to keep the peace. Therefore, to promote ownership on the part of the people, especially on the part of the agricultural people of the State, is in every way an object which those who have the welfare of the State at heart ought to seek to promote.' These words tell us plainly the foundation on which a nation's security rests and a nation's peace and prosperity is built.

"From the home the nation is made. If we have intelligent, refined, and cultured homes, we have an intelligent, refined, and cultured nation. How necessary is it, then, to surround the home with a pure, clear atmosphere of love. In the farm home the children are away from the temptations and evil influences that are too often to be met with in city life. Therefore, whatever can be done to make the farm home attractive and comfortable should be done, so as to secure the attachment of the young people to the soil; but also with the high aim in view of rearing for the nation those great and good men who lead and regulate the marts of the world, and those noble women who add grace and loveliness to home, and who are the nursing mothers of the world's great and good ones."

HINTS TO NEW SETTLERS.—No. 2.

BY THE EDITOR.

In last month's Journal, I explained the method of stripping bark, and the construction of a bark hut. I will now go a step further, and show how a more permanent structure can be erected at very small cost; and be it remembered that what is here stated is the actual experience not only of the writer but of numerous pioneers of agricultural settlement throughout Queensland.

The bark hut is certainly a very comfortable rest-house for a couple of young bachelors, but a time arrives when other people have to be considered—mothers, sisters, wives. For the comfort of a man's family, some better habitation must be provided, and the first step in this direction is the erection of a slab and shingle house. Such a house can be cheaply built out of local timber, and may be made as comfortable as the future building, which will be of sawn timber, galvanised iron roofiing, &c.

When it has been decided to put up a slab house, the first thing to do is to split the slabs, but the new settler may not have an opportunity of learning how to do this, and this article is penned for his especial benefit. Naturally, on plain lands, a slab building can only be adopted by obtaining the necessary material from timbered districts. These remarks will consequently only apply to dwellers in timbered country.

Amongst the best building timbers in Queensland are—the ironbark, several varieties of so-called gum trees, tallow wood, red gum, stringy bark, coolibah, &c., and, of course, the pines (Moreton Bay, Kauri, Bunya, and Cypress), also red cedar for inside work, and beech. Bloodwood is not a tree which is favoured for anything beyond posts for post-

and-rail fencing. For choice, we take red and blue gum, ironbark, and pine. It may be here mentioned that the Moreton Bay Ash (*Eucalyptus tessellaris*) of the Southern Coast of Queensland does not last long underground, and it is, therefore, not suitable for house posts or stumps. In tropical Queensland (Townsville, Bowen, &c.) it is a far more durable timber, and is much used for house stumps.

SELECTING A TREE.

Trees differ in toughness, and not every fine straight-looking tree will easily yield to the persuasion of wedges and maul. To select a suitable tree requires considerable experience, but the new settler will always find many amongst his neighbours who will put him in the right way to choose a tree that will "run"—*i.e.*, split easily. Some old

PLATE 9. —A WINDING TREE. FREE-RUNNING TREE.

splitters can tell at a glance whether a tree will run freely or not. Others judge by the bark in the case of iron and stringy barks, and also by taking out a good-sized chip, and trying its quality for splitting. Some trees are very windy, and, singularly enough, the twist is always from left to right, as may be seen in the illustration. Others, as seen by the bark, are "interlocked"; and such trees take great labour to open

PLATE 10.—INTERLOCKED TREE.

TREE WITH EXTERNAL KNOTS.

with wedges, but, once "burst," the slabs will generally run of even thickness from end to end. A "pipy"—*i.e.*, a hollow tree—may generally be recognised by noticing that some of the broken limbs are hollow, and that sometimes branches shoot out from the main stem almost from top to bottom. Such a tree is pretty sure to have a pipe, which makes it all the easier to split.

A tree showing large round knots on the trunk should not be rejected on that account, for the knots are rarely found to extend beyond the sap wood. The selected tree for slabs, rails, palings, or shingles should be a good-sized one with a straight barrel, from 2 to 4 ft. in diameter, or even larger, if possible, with at least 4 good cuts, each of 7 ft. 6 in. (for slabs), or 9 ft. for rails, and 7 ft. for posts.

HOW TO SPLIT SLABS, RAILS, AND SHINGLES.

We will suppose the tree to have fallen in such a manner that the butt lies 2 or 3 ft. clear of the ground, as in Fig. 3. In that case it would not do to begin cross-cutting until we have made arrangements for preventing the splitting of the log before it is completely cut through. There are several ways of doing this. The simplest is that shown in the figure. (The illustration referred to appeared in the January issue of the Journal.)

In this case, however, there is some danger to the sawyers. When the log is severed, it will naturally fall to one side or the other, and watchfulness and agility will be required to escape being crushed. As time is not always of very great moment in the case of timber-getting, it is better to make sure of one's life than to risk it by carelessness. Therefore, instead of putting a couple of blocks under the log as shown in the drawing, the better and safer plan is to build up a few logs underneath it, which will present a broad surface for it to rest on. Then a couple of wedges on each side will effectually prevent its moving when cut through.

Having cut off a length either for posts, rails, palings, or shingles, the next business is to burst it open. Let us take the operation as it affects posts. If we are working up an ironbark tree or a pine, we first remove the bark. With gum trees this is not necessary. Bushmen all have their own peculiar fads about opening a log. Some burst it completely in half to commence with, others first open the log from end to end, and then burst off billet after billet. Others again "slab" off without bursting, but this process is only resorted to when excessively wide slabs are required, and is of no sort of use in post and rail splitting. I always preferred to take the second plan, especially with a pipy log.

To begin, take the smallest and thinnest of the wedges, called the "entering" wedge. Drive this into the cut face at a point about 4 to 6 in. from the sap wood. If the log is a free one, a cracking and rending will soon be heard. Then enter a second wedge a little below the first and nearer the centre. Strike alternately at these with the maul till they are buried to the head, then insert a wedge in the crack opened on the top of the log and drive it partly home, helping its action by a couple more wedges further along. When these are got home the upper part of the log is burst. Take the axe and cut any strings or splinters which may be holding the burst sides together. Then remove the wedges.

If the log is a tough one, it will often happen that the entering wedge will jump out when struck. Should this occur, heavy blows of

the maul are useless, but a gentle tapping will often send the wedge home sufficiently to give a good grip. It is a good thing also to put some sand or earth into the opening made by the wedge, and this will usually have the desired effect.

Having opened our log, we now have to decide on the width of our rail—whether 10, 12, or 15 in. Say we decide on 12. We enter our wedges, as before, 12 in. from the opening, and shall now experience no difficulty in wedging off a billet 12 in. wide. We continue doing this on both sides of the log until only the bottom portion remains. We turn this over on its face, and then split it into three or four remaining billets. A log 3 ft. in diameter has thus produced us nine triangular billets, from which the rails have now to be "run." Running off the rails is light work compared with "bursting" off the billets.

The billet is laid on its back or side, and a wedge is entered at a point at either end, which will lift off the "heart" and leave the billet of a width of 12 in. on one side and 6 on the other. Now we take a wedge, and, stooping over the end of the billet, with a series a light taps, mark off the thickness of the rail—say 2 in. Then we enter two wedges at once, to prevent the wood splitting in a wrong direction. Sometimes when these are entered, a good drive of the maul will send them almost to the end of the billet, the rail jumping off without any more wedging being required. If it does not do so, then we take the running-out axe (which is about 14 in. long). Pass the blade in just ahead of the wedges, and heave on the long stout handle. The slab will be wrenched off for some distance.

Now, if the splitter slacks up on the handle to get a fresh purchase, he will find he cannot move the axe an inch forward, because the slab at once closes down on it and holds it as in a vice. Therefore, before slackening up, put in a wedge edgeways behind the axe; then you can slack up, and the axe will move a foot or so forward. Now give another wrench, and let your mate follow up with the wedge till a final "snap" indicates that the rail is run off. This will be our narrowest rail—say about 8 in. wide. Proceed in the same manner with the next until the billet is expended. We shall have from four to six rails, according to the thickness, but four is the usual number.

It does not always follow that rails will run out so accommodatingly as those described. When running off the first rail, we see the split getting further and further towards the sap, and this means that the rail will be 2 in. thick at one end and 6 in. at the other. It also means that our billet is ruined, or, at most, that we shall only get two rails out of it—a heart rail and an "outsider." We can, however, to a certain extent, obviate the trouble if we notice it in time. The remedy is to withdraw the axe and wedges, and start at the other end. Now here comes in a nicety in splitting. The rail is running out to a *thick* end. Obviously, if we re-commence operations at that end, the rail will run to a *thin* end. Hence we must start our rail at a good thickness—say 4 in. Now we run it out, and it gradually becomes thinner, meeting the other split about the centre. We have saved our rail, but it is what

is technically known at a "met" rail, and possibly useless owing to weakness in the centre. The late Mr. James Tyson, the Australian millionaire, was a good judge of rails. On one occasion he had a contract out for some miles of fencing; and being on the station when the fence was going up, he used to walk down and inspect the rails. When he found a suspicious-looking "met" rail, he placed one end on the lower rail of the fence and jumped on the centre. If it held out, well and good—if it broke, that rail was not paid for.

In the olden days, the heart was often put in as a top rail, but it is usually brittle, especially in the case of gum timber, and will decay much sooner than the others. Knots and excrescences on rails are not a disadvantage. Indeed, a knotty rail is often stronger than any other.

There is no need to go further with our description of rail-splitting. Each log of our 3-ft. tree has yielded us from 27 to 36 rails; and if it has been a free bursting tree and a good running one, we can get from 100 to 150 rails in a day. At £1 per 100, a couple of men in good timber can thus earn an excellent livelihood.

When I was timber-getting on Chiltern diggings, in Victoria, the price ran as high as £4 per 100; and as we were working up stringybark trees, the freest of all our forest timbers, it may be supposed that we made a handsome weekly cheque.

It may be asked why we did not at once cut up our whole tree into logs. It is because we might discover that the first log was either impossible to split, or that it ran so erratically that it would not be worth while to work up any more. Sometimes a fairly straight-looking tree will run rails somewhat "windy." Still it should not be rejected on that account, as a good fencer can work windy rails into a fence without detriment to its strength.

Post-splitting differs from rail-splitting, in that tough windy timber may be used, posts being of double the thickness of rails, and great thick heavy ends are rather an advantage than a detriment.

Slabs are run out in the same manner. Staves are split differently. Silky oak is the timber used for this work. The staves are all got the "bursting" way. No running out is done. The reason for this is that if the staves were run out the bilge of the cask would shell off much like an Austrian bent chair exposed to wet and sun.

SHINGLES.

The prettiest work in connection with splitting is the getting of shingles. Many trees that would not do for posts, rails, or slabs will work up into excellent shingles.

The blocks are cut off about 15 to 17 in. in length, and are burst into billets of a width of 6 in.

Some preparation is required for splitting shingles.

First, a horse has to be erected. The horse consists of a stout forked sapling with a butt about 3 ft. long and 6 in. in diameter.

The butt is supported against a tree at a height of about 2 ft. from the ground on a leaning fork. The two ends of the branches forming the horse are supported by two saplings slanting crosswise against another tree, as shown in Fig. 4.

A block is placed on the ground, which serves to support the billet to be split. The splitter has his billets lying handy, and usually piles up a dozen on the left side of the horse.

With his shingle throw in his left hand and wooden mallet in the right, he halves the billets, then quarters them, halves these quarters again, and so on, until the whole billet is split into shingles from ¼-in. to ½-in. thick. The sap shingle is usually thrown away, and no shingle under 3 in. in width is retained. The waste in shingle-splitting is very great, all hearts and outsides being rejected.

A good splitter will run out 1,000 hardwood or as many as 2,000 pine shingles in a day.

Some run each shingle off separately, but this requires judgment, as, when the first shingle is off, the next will run to a thick end, and the third to a thin end, entailing loss of time and possibly temper; so that the halving and quartering principle is undoubtedly the best.

In my next I shall deal with the splitting of palings and spokes, and with morticing post-holes and fence-erecting.

Figs. 5, 6, and 7 are given in illustration of this article in the January number of the Journal, page 12. How to put up a slab hut will be shown in my next article.

[TO BE CONTINUED.]

SOIL MANAGEMENT.

BY G. B. BROOKS, Instructor in Agriculture.

In the successful raising of farm crops the management of the soil is of the greatest importance. It is only necessary to observe the variations in the yield of similar crops on adjoining fields to find that, were up-to-date methods more generally practised in the preparation of the soil, the returns per acre would be materially increased.

When a crop fails, the cause is, unfortunately, too often set down to adverse climatic conditions. Although the weather has undoubtedly a very important bearing upon crop production, yet it is not always responsible for the poor returns.

In my travels throughout the various districts of the State, I have ample opportunity of studying the respective methods practised in the raising of crops and the results obtained thereby.

It is not an infrequent occurrence to come across a farmer harvesting a very heavy crop on one side of the fence, while his neighbour on the other, on similar soil, is reaping practically a failure. It is, therefore, necessary to look to some cause other than the weather for this disparity. Perhaps there is some truth in the remark made by the farmer who

was harvesting a fine crop while his neighbour was reaping a poor one. When asked the reason for the difference, his reply was, "I cultivate my soil—my neighbour irritates his."

The problem relating to soil fertility and crop production has received much attention from agricultural scientists during recent years, and, although much has been achieved, there still remains a very large field for investigation. Much prominence has been given, both in Australia and America, to the raising of crops with a minimum amount of rainfalls, and it must be admitted that marvellous results have already been secured by the adoption of the methods advocated.

The foundation stone upon which the success of the dry-farming system rests is fallowing—that is, keeping the soil cultivated and only taking a crop every alternate year.

So far, fallowing has received little or no attention in our State. On the other hand, the practice of securing two crops during the year is quite a general one, and this is undoubtedly, to a large extent, responsible for the low average yield obtained from some of our staple crops. I find that one of the most important factors in successful crop production is the early preparation of the land, but, with the system of double cropping just mentioned, this cannot be given effect to. I am not inferring that cultivation is carried out in a slipshod manner, for it may be that every care has been taken in ploughing and pulverising the soil to form the necessary seed bed, but, unless a certain period is allowed for the soil to "mature," or, in other words, to permit of the necessary plant food becoming available for the needs of the crop, it is impossible to secure a full return.

This point is not at all difficult to demonstrate. It is only necessary to take a quickly maturing crop, such as Panicum, and watch results. As an example, I will relate one experience of many I had, showing the effect of early and late preparation. In a field of 30 acres, 10 were ploughed four months; 10, two months; and 10, just previous to planting. The whole area was planted with Panicum at the same time. The result in green material cut for silage was:—For the four months, 12 tons per acre; for the two months, 6 tons per acre; and for the portion ploughed previous to planting, nil.

Although the weather was very favourable during the growing period, the seed on the freshly-ploughed area practically refused to germinate—only a few small patches appearing where timber had been burned off. This failure of seed to germinate when sown in newly-ploughed land, more especially where the soil is of a stiff character, has often been observed. Germination will eventually take place, but it may be weeks or months later. Numerous examples of a similar nature were to be met with in the 1911 wheat crop, and to a lesser extent during the past season. In every district individual fields were to be met with giving a good yield, while adjoining areas were practically a failure. On investigation it was discovered that, in almost every instance, early preparation of the land was responsible for the successful returns.

[TO BE CONTINUED.]

WATER SUPPLY TO FARMS.

[CONTINUED FROM DECEMBER ISSUE.]

BY ARTHUR MORRY, Surveyor, Departme t of Agriculture and Stock.

SPRINGS AND SUBTERRANEAN SUPPLIES.

Surface waters are easily contaminated, and for this reason underground supplies are often preferred. Nature has so bountifully distributed her blessings, by the storing up of vast reservoirs of water underground, that few, if any, homesteads need be without a reliable supply for domestic and stock uses. These supplies, however, are often difficult to locate, and geological indications do not always encourage a search; but it is sometimes the case that, when a geological examination of the strata gives negative results, other means are successfully used to discover streams and springs in those geological formations which are supposed to be of a non-water bearing character. What are called "faults" often occur at great depths which completely upset scientific deductions, and rocks of an impervious character are frequently cut off by a comparatively narrow belt of porous material, of which there are no surface indications.

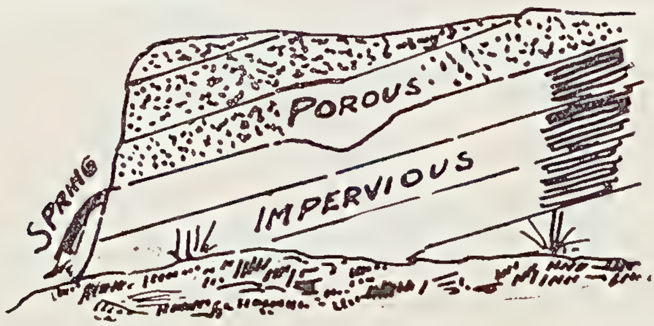
It is an established fact that all underground streams flow in the direction of the ocean or the nearest river bed, into which they discharge under pressure. Those streams may be wide or narrow, tortuous in their course, and undulating just as surface streams. Their velocity will vary according to circumstances, and will be determined by the outlet, the fall, and the density or porosity of the material through which they flow. That these streams exist has been incontestibly proved, and their course sometimes determined; they form the outlets or overflows of large underground reservoirs of quiescent waters, which are continually replenished by rainfall sinking through the porous stratas. This action has gone on for ages, the large reservoirs below receiving constantly fresh supplies, under great pressure, and being relieved of the surplus by these safety-valve overflows.

Some parts of Queensland are known to have practically inexhaustible underground reservoirs, covering extensive areas, over the whole of which water may be found at moderate depths. The Burdekin Delta and some portion of the Don River country, near Bowen, are illustrations of this; the rainfall has percolated through porous material until it has reached an impervious bed of rock or clay, on which it rests, and is prevented overflowing at the surface, and so forming a swamp or lake, by streams finding outlets in the ocean or in river beds under pressure.

By what is called "capillary attraction" water is retained in these porous beds, just as in a sponge; and when they are saturated, as they are after heavy and continuous rainfall, the excess drips out or flows away quickly or slowly, just in proportion to the pressure.

Sandstone and gravel will absorb just about one-quarter of their weight of water before they become saturated, and after that every 100 tons flowing in displaces another 100 tons, which must flow out. These porous beds containing this "ground water" do not always lie horizontally. The forces of Nature have twisted them into curves lying at

all angles with the horizon; this is called the dip of the strata, and is expressed in degrees, east, west, north, and south. A porous bed of sandstone or gravel lying at an angle with the horizon will, naturally, collect at its outcrop the rain falling on or passing over it; this will descend until it meets with a layer already saturated, and, if there is no outlet, no stream by which it can escape, the whole of the porous bed will become in time thoroughly saturated and what we call "water-logged." This condition may be seen often on some lands after heavy rainfall; but if a gully or an embankment intervenes, cutting off this strata and providing an outlet at a lower level, then we have what is called a *spring,* and, as springs so described are not subjected to hydrostatic pressure, they are known as land springs. Deep-seated springs, however, are of a somewhat different character; they derive their supply from the surface of a porous strata at a high level, taking in the rainfall, which passes under an impervious stratum and soaks into and through the porous material until it meets a substratum of clay or rock, when it follows the lowest levels, looking for an outlet, by the same laws which govern its flow above ground. When a hole is drilled through the impermeable strata, the water will rise in the hole to the height corresponding to the hydrostatical pressure upon it. All bores are supplied by these deep-seated springs. The diagram Fig. 11 illustrates a land spring very often met with.



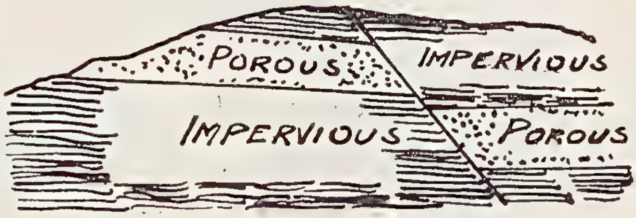
—FIG 11—

It will be seen that the water has soaked through the upper stratum until it has come in contact with rock laying at an angle with the horizon, which it follows to the outlet on the side of the bank.

A continuous line of springs often reveals the presence of a fault, and shows that the rocks have been dislocated and cracked and thrown out of level for great distances, thus diverting the course of underground streams and forcing the water to seek other outlets.

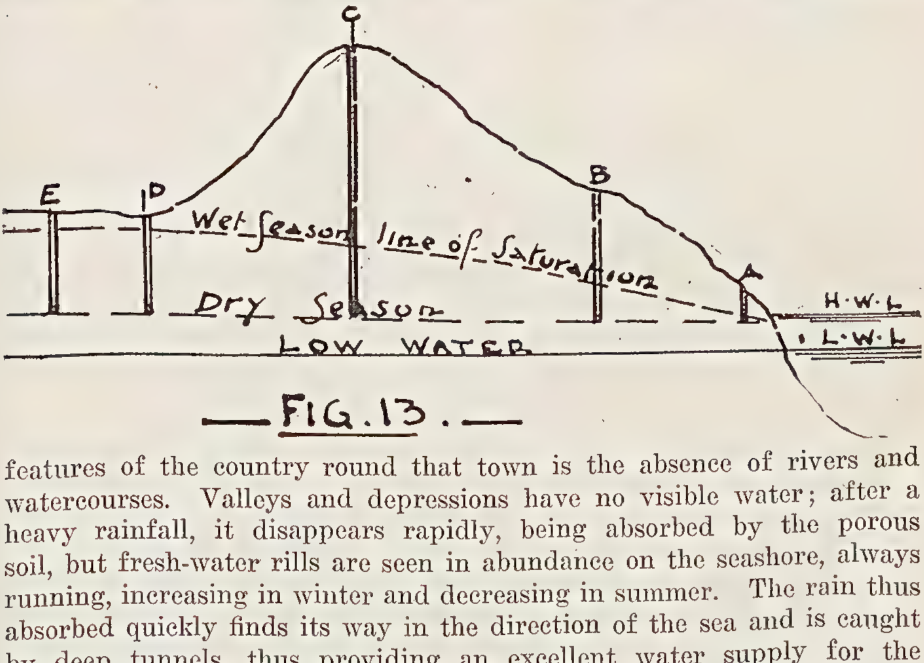
The diagram Fig. 12 illustrates a fault, and shows how it cuts off springs from the water-bearing strata; by this upheaval the stratum has been so diclocated and broken up that the lowest outcrop is totally devoid of springs, and the water may pass down the intervening crack to great depths, forming streams far remote from the point of entrance.

The movement of underground water towards the sea or river beds has been proved in several cases by the construction of tunnels running parallel to the seashore or to rivers; and it has been found that these



—FIG. 12—

tunnels, which form underground reservoirs, instead of drawing their supplies from the sea or the river by percolation, as was at first supposed, have really intercepted the flow of underground water which would otherwise have discharged into the sea or river. This was the case at Berlin; also at Brighton, in England. The latter is well illustrated by the diagram Fig. 13. One of the most striking



—FIG. 13.—

features of the country round that town is the absence of rivers and watercourses. Valleys and depressions have no visible water; after a heavy rainfall, it disappears rapidly, being absorbed by the porous soil, but fresh-water rills are seen in abundance on the seashore, always running, increasing in winter and decreasing in summer. The rain thus absorbed quickly finds its way in the direction of the sea and is caught by deep tunnels, thus providing an excellent water supply for the town. Similar conditions exist in many parts of Queensland, where the underflow could be intercepted and used (diagram Fig. 13).

From the diagram it will be seen that the fall of the ground is not the same as the fall of the water. From C to D the ground falls rapidly to the left, but the water falls in the opposite direction; the outlets in this case are just below h.w. mark, at which point the level is constant. From the dotted lines it will be seen that the line of saturation varies with the wet and dry season, but always flows towards the same outlets. In the same way springs appear on the sides of hills or ridges; and, if a channel deep enough to intercept the underflow was cut parallel to the line of ridge, often an excellent supply could be obtained.

[TO BE CONTINUED.]

Pastoral.

THE FARMER'S SHEEP.

BY W. G. BROWN, Sheep and Wool Expert.

FEEDING.

[CONTINUED FROM DECEMBER, 1912.]

I have before me an exhaustive work on lucerne by Mr. E. D. Cobourn, secretary to the Board of Agriculture, Kansas, United States. It is called "The Boon of Alfalfa." It should be acquired by every lucerne-grower in the State. For sheep-farmers, especially, it will be very useful. Mr. Cobourn has so lucidly put the matter before his readers, and so many have no access to the book, that I do not hesitate to quote from it anything which belongs to our subject, "The Feeding of Farmers' Sheep."

The plant has been known to the Eastern peoples for thousands of years, and was introduced into America by Cortes, in 1519, where it has thriven in Mexico ever since. It is claimed that one field in that country has been continuously productive for over 200 years. Consequently, its usefulness and habits are thoroughly well known. In regard to its cultivation, a well-known authority on lucerne-growing gives to Mr. Cobourn a list of "Musts" and "Don'ts," which embraces most of what can be said in that respect. The authority says: "I have been growing lucerne from boyhood; have been familiar with it for over 25 years; and have grown it successfully on almost every variety of soil, from stiff clay upwards. Here you are then:—

"Seed must be pure. If doubtful, consult nearest experimental farm.

"Soil must have lime; if not, lime must be added."

"Land must be well-drained either naturally or artificially."

"Land must be fertile to a depth of at least 9 in. Beyond that depth, the tap-root, in its search for moisture, will look after itself."

"Don't sow any nurse crop."

"Don't sow on newly-ploughed land."

"Don't allow weeds or grass to grow over 6 in. high without cutting."

"Don't cut when wet with rain or dew."

"Don't allow lucerne to stand. If turning yellow, cut."

"Don't sow old seed."

"Don't sow less than 20 lb. per acre—one-half each way."

"Don't sow 25 acres at first. Sow 5."

"Don't graze it."

"Don't put rotten manure anywhere, but in your lucerne field."

"Don't let water stand on it."

"Don't trust 'culture cakes' on your land, obtained from other fields."

"Don't let it go if the 'stand' is thin, but disk in more seed."

"Don't be afraid that you will kill it by disking."

"Don't wait for it to stool. It never does."

"Don't try to cut for hay until lucerne holds the field."

"Don't sow on land not well underdrained."

"Don't leave the land rough. Use a roller or a plank float, to level and smooth it."

"Don't give up trying to grow lucerne."

"Cutting is an invigorant. Cut first crop just when it is ready to bloom."

"This is the law of alfalfa:—It must be cut down. It takes courage to cut baby lucerne, but it must be cut to save it."

"The critical time is the first six weeks of its life."

"Save the leaves. They are worth four times as much in feeding value as the stems."

"Lucerne is the child of the Sun. Shade kills it. It is not a good fighter in its youth against adversaries of any kind."

"Grazing with stock is an expensive and extravagant method of gathering a crop from high-priced land. A man with machinery can harvest more economically than a cow, steer, horse, or sheep."

"No animal should be turned in to graze until second or third year of life of plants."

"One acre of lucerne cut is equal to 5 acres pastured."

The above are texts upon which Mr. Cobourn expounds, in 324 pages of matter, most interesting to the lucerne-grower. Besides these, he devotes a good deal of space to discussion of the feeding values of lucerne, in comparison with other classes of fodder, and also on the effects of the plant if injudiciously used in feeding. We in this State are accustomed to the fact that some animals die from "Bloat" (*Tympanitis*) under certain conditions (which are often obscure), when they are turned into a lucerne paddock. From far and wide, Mr. Cobourn has collected facts and opinions, which are extremely valuable to us as a stock-raising community. An abstract of these may be useful to our sheep farmers:—

"In 'Bloat' or *Tympanitis*, much depends upon the nature or condition of the animal. Sick or ailing animals are liable to bloat much more readily than healthy strong sheep."

"I have found (an authority states) that on clean lucerne land there is little or no liability to bloat after the plant begins to bloom. I

usually have some dry hay in the paddock, to which the animals have access."

"A mixture of other grasses minimises if it does not altogether eliminate the affliction."

"Lambs are rarely killed with 'Bloat.'"

"My losses in death of lambs from pasturing on lucerne are much less than I used to suffer from parasitic diseases, which never trouble lucerne-fed lambs."

"Sheep are much more liable to 'Bloat' on windy days; especially if the wind be moist."

"I find one half-pint of sweet milk, administered when bloated, will relieve an animal at once."

"I never allow sheep on lucerne when empty; I always give them a little dry feed before turning them into the field, and sort out the sick or ailing animals, not allowing them to go on to the lucerne at all."

Mr. Cobourn quotes another authority:—

"At the beginning of the season I give my sheep dry feed in the morning, before turning them into the lucerne field."

"I have water in the field all the time. Access to water minimises the effect of 'Bloat.'"

"I keep the flocks permanently on the lucerne, night and day, until finished off, when once placed there."

"I prefer uplands to flats in respect to bloating, and watch the stock carefully for a few days. If I find any showing symptoms of 'Bloat,' I remove them permanently, for, once bloated, a sheep is always liable to the trouble."

"I have learned that only a small proportion of animals are liable to 'Bloat' on lucerne. It is thus probable that the affliction is caused by a derangement of the digestive apparatus."

"In the last resort I use the trocar and canula, and if the instrument is not handy I use a knife, and insert a quill or small tube. One percentum of deaths may be expected from the use of either, in cases treated."

"A neighbour of mine uses a handful of common salt, placed on the back of the tongue of the bloated animal. He is satisfied with the result."

Reference has been made above to the use of the trocar and canula, or, in the absence of that instrument, the knife in tapping for "Bloat." It may be well to give directions for the use of such, in the words of Mr. Mayo, a well-known American veterinary surgeon*:—

". . . . The best method of tapping is by means of a trocar and canula. A trocar is a sharp-pointed instrument, 5 or 6 in. long, and about the thickness of a lead pencil, with a handle at the end. Over

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* For illustration of and directions for using the trocar and canula, see issue of this Journal, for March, 1900, p. 233.—Ed. "Q.A.J."

the point of the trocar slips a tube, called a canula, not quite as long as the trocar, with a wide flange around the upper end of the tube, which prevents the tube slipping into the stomach.

"To use the trocar, proceed as follows:—Tie the animal so that it cannot escape, and make an incision through the skin over the prominent part of the swelling on the *left* side. This incision should be made halfway between the point of the hip and the last rib. The incision should be made quickly. After the incision is made, the trocar and canula are pushed in, and directed *downwards, inward, and forward*; push the trocar in, until the flange of the canula rests against the skin. Withdraw the trocar, and the gas will rush out; that is, it usually does so; occasionally, however, the end of the canula is plugged up with green food. This may be remedied by pulling the canula out part way, or pushing in the trocar again, and then withdrawing it. If this does not work, tap the stomach again in another place, using the same incision made at first. The escape of gas is usually followed by a little green food. If a trocar and canula are not available, in an urgent case a knife may be successfully used—a good-sized pocket-knife blade, pushed quickly through the skin and muscles in the same manner as described for the trocar and canula. Care must be taken that the sharp edge of the knife is not turned towards the animal's tail, as the sheep is liable to jump forward, and a much larger hole made than is necessary. Sometimes a quill or small tube may be inserted to keep the incision open. If the operation be quickly and intelligently performed, there is little danger to the animal, one percentum of deaths being the greatest. Use an antiseptic on the wound after treatment."

A final paragraph may be quoted on the subject of feeding sheep, from Mr. Cobourn's book, which epitomises the value of lucerne to a sheep farmer:—

"A consensus of opinion from practical sheep-farmers from all over the States is—They can market fat sheep and lambs from lucerne fields, at one-half to one-third the cost of maintenance with any other crop. Green or dry, it hastens development, and the lambs are in finer condition."

Therefore, to quote one of the "Don'ts":—"Don't give up trying to grow lucerne." There are many successful sheep-farmers in this State who grow little else, and Mr. Cobourn thinks it may be grown anywhere. Get "The Book of Alfalfa.'

[TO BE CONTINUED.]

THE "TANDAWANNA" SHEEP DIP.

Owing to the unavoidable absence of our artist last month, an illustration which should have accompanied Mr. W. G. Brown's description of Mr. Geo. Watson's sheep dip had to be held over for the present issue. The rough sketch sent to us was somewhat difficult to elaborate, but the artist, Mr. Mobsby, has, we think, given a very clear representation of it.

Fig. 1. *Ground Plan.*

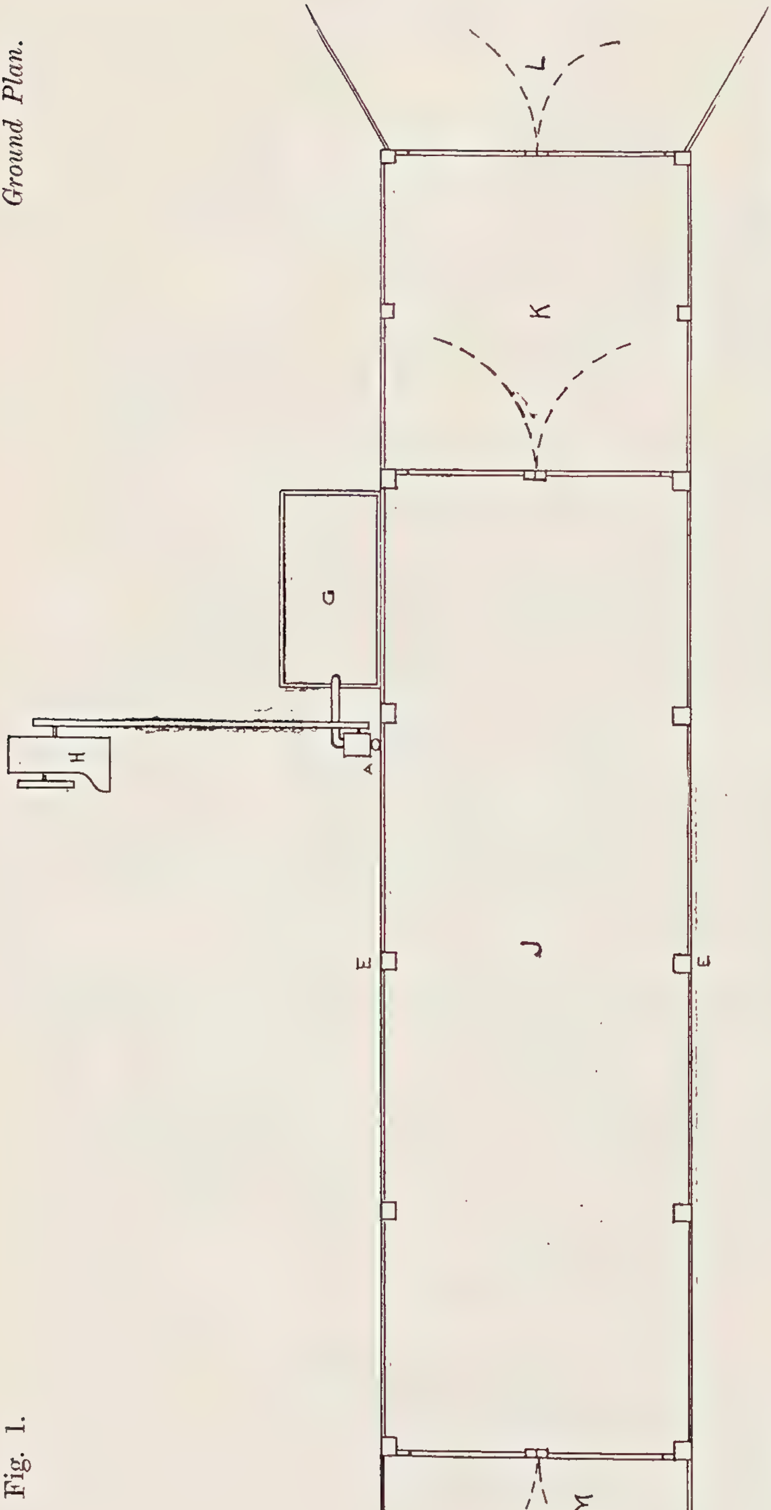
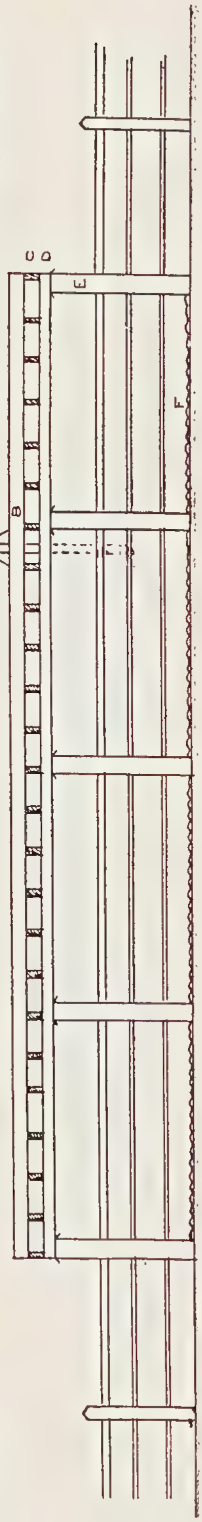


Fig. 2. *Side Elevation.*



Mr. W. G. Brown, whose articles in the Journal on pastoral matters, especially on the sheep, have been so favourably received by pastoralists, grazing farmers, and others, writes as follows to correct an error in the specifications for the "Tandawanna" sheep dip:—

"I desire to rectify an important part of the specifications for the 'Tandawanna' dip, published in the issue of the Journal for January. It is in accordance with a note from Mr. Watson, who points out that the joints are not soldered; they are tacked down, and the leakage is negligible. The soldering or not makes a considerable item in the first cost of a 'Tandawanna' shower dip. I should have mentioned, too, that ewes heavy in lamb may be safely dipped by this method; by the other it is practically impossible."

TANDEWANNA SHOWER SHEEP DIP.

The shed is 40 ft. long by 12 ft. 6 in. wide. The roof B is flat and covered with No. 22 gauge, flat galvanised iron, soldered at all seams, and perforated with No. 10 holes 3 in. apart. The iron is turned up all round the edge about 6 in. Thus the roof is really a big iron tray.

Roof joists C are 6 in. by 2 in., and placed 18 in. apart, and run across the building. The height of the shower is about 6 ft. above the floor. The floor is of corrugated galvanised iron, No. 22 gauge, and not battened. The sheep have not injured it in any way in three years' working. The floor is laid with a fall to the side of 2 in. in 10 ft. across the shed. The channels of the corrugation lead into a gutter, which carries the liquor draining off the sheep back into the dip tank G, where the dip liquor is mixed. The dip tank is an excavation 8 ft. by 4 ft. by 4 ft., lined with flat galvanised iron and made watertight. From this tank a 3-in. centrifugal pump, A, worked from a 3½-b.h.p. oil-engine, H, delivers the dip mixture on to the tray roof of the shed, and this falls in a gentle penetrating shower on the sheep standing beneath. A pair of gates at each end of the shed holds the sheep.

E. Posts 6 in. by 6 in., 9 ft. long, with 3 ft. in the ground.
F. Corrugated iron floor.
J. Shower area.
K. Race from yards.
L. Yards.
M. Race to drying yards.

Plans—
Fig. 1. Ground plan.
Fig. 2. Side elevation.

Dairying.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

MILKING RECORDS OF COWS FOR MONTH OF DECEMBER, 1912.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Test.	Commercial Butter.	Remarks.
			Lb.	%	Lb.	
Lady Loch ...	Ayrshire	10 July, 1912	782	5·5	49·77	
Glen ...	Shorthorn... ...	5 Sept. ,,	932	4·2	43·85	
Lass ...	Ayrshire	30 Nov. ,,	862	4·7	43·71	
Rosalie ...	,, ...	5 Aug. ,,	872	3·9	37·84	
Silver Nell...	Shorthorn... ...	29 Oct. ,,	761	4·4	37·58	
Bluebelle ...	Jersey	2 Aug. ,,	648	5·1	37·22	
Auntie ...	Ayrshire	4 July ,,	723	4·4	35·70	
Miss Edition	Jersey	13 Aug. ,,	712	4·4	35·16	
Pauline ...	Shorthorn... ...	7 Dec. ,,	642	4·4	31·65	
Lady May ...	Ayrshire	19 July ,,	541	4·2	26·07	
Burton Lily	Shorthorn... ...	5 Oct. ,,	591	3·8	25·31	
Gem ...	,, ...	29 April ,,	561	4·0	25·07	
Bella ...	Ayrshire	4 Dec. ,,	596	3·7	24·65	
Burton's Lady	Shorthorn... ...	1 June ,,	543	4·0	24·26	
Honeycombe	,, ...	29 Aug. ,,	463	4·1	21·23	

NEW MILKING MACHINE: A QUEENSLAND INVENTION.

In our advertising columns will be found particulars of the first Queensland invented and patented milking machine. The invention is by Mr. R. E. Shepperson, an up-to-date young dairy farmer, who, first of all, installed an imported milking machine, and, while overcoming certain difficulties with it, gradually improved and built up a simple and entirely new type of milker. In this he has had the assistance of Messrs. W. A. Preston and Co., well known throughout the State as providers of first-class dairy machinery. The "Shepperson" milking plant consists of a vacuum pump, vacuum tank, line of piping over the bails, with vacuum gauge, safety valve, and gun-metal pulsation, and vacuum taps of simple and effective design, nickel-plated to ensure cleanliness. The claw is also of gun-metal and plated; and this, with the special teat-cup inflation, may be said to be the live part of the "Shepperson" invention. Each teat-cup is supplied with a tap, and when the cup hangs down the tap is shut, and the vacuum "off." As each cup is raised to attach to the teat, the tap opens, and the vacuum is "on." Thus, one teat or more may be milked at a time; in fact, in one herd milked by the "Shepperson" patent is a cow with only two teats. She is milked with the ordinary claw, with two cups hanging down, and thus automatically shut off. The rubber inflation is, perhaps, the most important part of

the plant. It is unique in design, being oblong in section, constructed with longitudinal threads to prevent elongating, and with steel spring insertions embedded in the rubber to control the action on the cow's teat and imitate the action of the hand in milking. Shepperson milking plants are being installed on the Northern Rivers of New South Wales and in different dairying centres in Queensland. Orders are now coming in faster than the machines can be made, and special machinery is being put down in Brisbane to cope with the work. The inventor and manufacturers are to be congratulated on their enterprise, especially as the Shepperson machine has already proved capable of milking so effectively as to be used with equal satisfaction during the slack months of winter and in the full supply of summer.

NOTES ON THE EXTRACTION OF BUTTER-FAT FROM WHEY.

By E. GRAHAM, Dairy Expert, Department of Agriculture and Stock.

In July last it was my privilege to read before the members of the Cheese Manufacturers' Association a paper on the subject of the by-products of cheese manufacture.

Subsequently the Greenmount Co-operative Dairy Company thought fit to act on the principles advocated by me, and they accordingly set their attention towards the recovery of the butter fat from the whey supply at their Greenmount factory.

The Greenmount Co-operative Dairy Company can, therefore, lay claim to be the first dairy company in this State to turn the butter fat of whey to commercial account.

Recently I spent a little time at Greenmount, in order that I could gather first hand particulars of the methods adopted by the company there, and utilise the information for the purpose of inducing other cheese companies to engage in the systematic extraction of the butter fat from whey, and, as a consequence, become participants in the profits to be derived from such a source.

It is due to the courtesy of the manager of the Greenmount Company (Mr. C. Peters) that I am able to give the following detailed particulars of the various stages of the operations as practised by the company, but, before doing so, it is perhaps best that I should give some guide as to the additional plant required to carry out the work.

The appliances necessary, over and above those embraced in the equipment of the ordinary cheese factory, will be, generally, a separator of a capacity equal to the separation of several hundreds of gallons of whey per hour, and one large and one small shallow vat—the large vat to be used to contain the whey as it awaits separation, and the smaller vat to catch up the whey as it is discharged from the cheese vats. An ejector possibly provides the best means for conveying the whey from one vat to the other.

Upon the day of my visit to Greenmount, the daily delivery of milk was 1,588 gallons, with an average butter-fat test of 3·8 per cent.

For the purpose of cheese-making, the milk was placed in three vats, and the test of the milk in the several vats was 4·1 per cent., 3·5 per cent., and 4 per cent. butter fat. When the curd was soaked, the whey was discharged from the milk vat and caught in the small shallow vessel mentioned above, and from it the whey was elevated by the ejector into the separator vat. The process of separating the butter fat from the whey was commenced immediately there was a sufficient quantity of whey available. The butter-fat test of the whey discharged from the several milk vats varied from ·18 to ·22 per cent. Three vats of milk seemed to work about normal, and it was interesting to note that the curd from the milk testing 3·5 per cent. butter fat shed a similar amount of fat in the whey as that produced by the milk testing 4 per cent. fat. The temperature of the whey at the time of separation varied from 115 to 136 degrees Fahr. Naturally, the higher the temperature of the whey, the more perfect was the skimming of the separator and the smaller was the percentage of butter fat discovered in the skimmed whey. Numerous samples of the skimmed whey were tested (Babcock method) in an ordinary skim-milk flask, and the result of a series of these tests showed the butter-fat content of the skimmed whey to range from less than ·01 to ·02 per cent. After salting, the whole of the curd secreted about 12 gallons of white whey, and this, in turn, yielded an average test of 4·8 per cent. butter fat. The white whey was subsequently mixed with the ordinary whey from the milk vat, and, with it, was duly passed through the separator.

The mixing of the two wheys made no perceptible difference in the process of separation, other than to increase the volume of the flow of cream from the separator. The addition of the white whey, however, had a marked influence on the quantity of fat that was unrecovered by the separator, and, under the changed conditions, the loss of butter fat in the skimmed whey rose to :04 per cent., or fully double the amount of fat primarily lost in separation.

At the conclusion of the operations of whey-skimming for the day, the result was that the factory had recovered, from the whey of 1,588 gallons of milk, 53 lb. cream containing 50 per cent. butter fat, equivalent to 32·43 lb. commercial butter, which amount, at 10d. per lb., had a value of £1 7s.

During the month of September last, the Greenmount Company separated the whey from 29,523 gallons of milk, and the return from the butter factory receiving the cream was a cheque for £19 13s. 2d. Due to an accident in transit, 58 lb. cream, with 43 per cent. test, was lost, so, virtually, the proceeds for the month may be reckoned at £21. The ruling rates for commercial butter ex. cream during September were 10½d. per lb. for A1 grade cream, and 10d. per lb. for No. 1 grade cream, and, as regards quality, the butter factory's classification of the whey cream was on the basis that the whey cream produced 337 lb.

of butter of A1 quality, and 188 lb. of butter No. 1 quality, or, expressed in other words, over 70 per cent. of the cream produced was of A1 quality. The experience of the Greenmount Company goes to show that, outside the outlay involved by the purchase of the appliances enumerated above, the only additional cost to an ordinary cheese factory desirous of taking up the extraction of butter fat from whey would be represented by the purchase of several extra cords of wood each month.

The reclamation of the butter fat of whey is past its experimental stages, and the process has been carried to a successful issue in several countries where cheese-making is in prominence. The small expense of the plant required to inaugurate the system, and the relatively handsome profits to be derived from the adoption of the practice, should provide ample encouragement for many of our factories to take the matter up without further hesitation; especially does this apply in the case of factories that, during the flush of the season, experience a difficulty in getting the dairy farmers to cart home their full complement of whey.

It is freely admitted that the extraction of even a small portion of butter fat from the whey cannot do other than slightly decrease its value as a food for lower animals; but, against this, it is maintained that whey, under the most favourable conditions, provides a very poor and inadequate ration for the young calf, and, accordingly, dairymen should never allow the calf to be dependent solely on whey for its sustenance.

The Agricultural Chemist (Mr. J. C. Brünnich) has generously furnished me with the following information relative to the feeding of calves; and the instruction given by him as to the most economical means of utilising whey as the basis of a ration for the calf at its various stages of growth should be of inestimable value to the dairyman who is fully cognisant of the importance of conserving the essential constitution in the young animals that are reared for the purpose of filling a place in the ranks of the dairy herd:—

"For a very young calf butter fat is very necessary on account of its greater digestibility, and, therefore, mixing of whey with milk is to be recommended. The first fortnight give only cow's milk; then add whey in increasing amounts. When 8 to 10 weeks old, whey alone, with the addition of linseed meal or oilcake, can be used, remembering that a calf 2 to 3 months old requires daily about 1½ to 2 lb. solid matter, and 3 to 6 months old from 3 to 5 lb., or, roughly, 1 lb. of solid food for every 100 lb. of live weight. Two gallons of fresh milk contain nearly 3 lb. of solid matter, 2 gallons of skim milk about 2 lb., and 2 gallons of whey only 1½ lb. of solids. The difference may be made up by the addition of linseed meal (prepared by boiling 1 lb. of meal in 2 quarts of water), starting with about 4 tablespoonfuls of the dry meal, gradually increasing up to 1 lb. daily. After 2 months, the linseed meal may be partially replaced by pollard. Sunlight oilcake can be also used instead of linseed meal."

Poultry.

REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, DECEMBER, 1912.

Three thousand eight hundred and ninety eggs were laid during the month, an average of 129·7 eggs per pen. Mrs. Craig again wins the monthly prize with 150 eggs. The following are the individual records:—

Competitors.	Breed.	Dec.	Total.
R. Burns	Black Orpingtons ...	146	1,183
T. Fanning	White Leghorns ...	146	1,124
A. T. Coomber	Do.	143	1,093
J. Gosley	Do.	114	1,071
E. A. Smith	Do. (No. 2)	133	1,067
H. Tappenden	Do.	142	1,065
Range Poultry Farm	Do. (No. 1)	135	1,062
J. R. Wilson	Do.	147	1,055
Yangarella Poultry Farm	Do.	118	1,026
A. R. Wooley	Do.	122	1,017
Mrs. Sprengel	Do.	142	982
R. Burns	Silver-laced Wyandottes	128	978
Mrs. Beiber	Brown Leghorns ...	116	976
W. D. Bradburne, N.S.W.	White Leghorns ...	113	967
E. A. Smith	Do. (No. 1)	114	959
Cowan Bros., N.S.W.	Do.	126	956
B. Holtorf	Do.	132	945
J. Zahl	Do. (No. 1)	131	915
A. H. Padman, S.A.	Do.	143	908
Range Poultry Farm	Do. (No. 2)	131	897
J. Holmes	Do.	132	883
H. Hammill, N.S.W.	Do.	127	873
J. Zahl	Do. (No. 2)	130	873
D. Grant	Do.	119	851
F. W. Cornish	Do.	132	840
Mrs. Craig	Do.	150	831
W. W. Hay	Black Leghorns ...	121	821
R. Burns	White Leghorns ...	127	804
Mrs. Dredge	Do.	111	789
J. F. Dalrymple, N.S.W.	Do.	119	766
Totals	...	3,890	28,575

State Farms.

SMUT EXPERIMENTS.

VARIETY TESTS AT BUNGEWORGORAI STATE FARM, ROMA.

The differences in the susceptibility of the different varieties of wheat to dry weather, rust, &c., are very marked, and have been the great factors in guiding the selectors in their endeavours to secure or produce a wholly suitable variety in the past, as they will still be in the future.

A wheat, to be suitable from a farmer's point of view, must produce a goodly crop of grain consistently, to do which in Queensland, under the varying conditions, the variety must be rust-resisting as well as a good dry-season wheat. Now the grain of these, to be suitable from a miller's point of view, must be of good appearance, good milling quality, free from oats and other seeds and foreign matter, with an entire absence of smut.

The susceptibility or otherwise of various wheats to smut is not taken into consideration by the majority of farmers, and, indeed, such need not worry them to any great extent, providing that the seed, before being sown, is treated, as, even if smutted seed of a variety known to be susceptible be sown, the presence of bunt in the ensuing crop can, in a great measure, be governed, if not entirely prevented, if such is done with one of the few fairly reliable methods advocated. To the man who does not treat his seed, the danger to his crop varies according to the variety sown, as well as weather conditions, &c.; and from results it seems that the more suitable a kind is in other respects, the more is it liable to smut. This really means that the early maturing rust-resisting varieties are more prone to it than the later ones, which is borne out in the results obtained this season, though there is one notable exception—viz., with Florence, the earliest variety we have, which gave 100 per cent. clean plants. This result may have been due to some outside cause, and not to immunity, and the experiment with this, and, in fact, with any other varieties low in the number of smutted plants produced, cannot be taken as final unless the same were a record of years, which it is not. It may be stated that all the seed was not infected with the same supply of smut, by which is meant that, instead of all the bunt balls being broken into a vessel, and the grain smutted therein, the bunt balls were broken over the different lots of seed as required, with the result that in some cases the smut spores may have been sterile or of lower vitality than those where a high percentage of smutted plants were obtained.

The following varieties were tested:—

Variety.	Flowering.	Plants Examined.	Per Cent. Clean.	Per Cent. Dirty.
orence	26 September ...	90	100	...
Bishop	16 October ...	89	100	...
Bald Medeah	10 ,, ...	63	100	...
Cretan	25 ,, ...	55	100	...
Le Huguenot	10 ,, ...	74	100	...
Belatourka	20 ,, ...	72	94·2	5·8
J. Brown	15 ,, ...	68	92·7	7·3
Manitoba	28 ,, ...	80	92·5	7·5
Amby	28 September ...	71	90·2	9·8
Comeback	29 ,, ...	68	88·2	11·8
Yandilla King	4 October ..	73	85·0	15
Xbred 91	30 September ...	68	79·5	20·5
Warren	6 October ...	83	77·2	22·8
Federation	1 ,, ...	82	73·9	26·1
Xbred 349	1 ,, ...	65	70·8	29·2
Bunyip	26 September ...	68	69·1	30·9
Ward's Poland	1 October ...	49	63·3	36·7
Sussex	20 ,, ...	57	61·5	38·5
Hermitage No. 1	8 ,, ...	83	61·5	38·5
Cumberland	10 ,, ...	82	61	39
Bunge No. 2	28 September ...	73	58	42
Fed. x Bunge No. 1, 33 ...	26 ,, ...	87	55·2	44·8
Bunge No. 1	28 ,, ...	68	55	45
Mould's	6 October ...	63	50·8	49·2
Rymer	10 ,, ...	52	49·9	50·1
Xbred 353	4 ,, ...	69	47·9	52·1
Budd's Early	20 ,, ...	74	46	54
Gluyas	6 ,, ...	90	45·6	54
J. C. 157	20 ,, ...	75	41·4	58
Bobs	29 September ...	54	40	60
Ward's Prolific	29 ,, ...	52	25	75

EXPERIMENTS WITH SMUT.

PREVENTIVES AT ROMA STATE FARM.

Until a smut-proof wheat has been evolved—that is, one possessing the other necessary qualifications and characteristics as well—it will be essential for the farmer to treat his seed before sowing with one of the many recognised methods advocated for its prevention. How true this is, and the danger which is run by neglecting to do this, can be gathered from glancing at the variety tests, where it will be seen that many of our most suitable kinds are susceptible to smut, so much so that in every 100 bags some of them would produce 75 containing nothing but smutted grain. To further emphasise the danger of neglecting to treat wheat *if it is not known to be free,* it is only needful to state that each one of these grains in the smutted bags is computed to contain 4,000,000 spores—sufficient to infest every grain in a bushel of wheat with four to six spores, each of which is capable of resulting in a smutted plant under desirable conditions.

In order to ascertain which of the recognised methods was the most suitable—that is, the cheapest, easiest to accomplish, and one giving the best results—as well as for the purpose of finding out the relative value of some of the new ones, suggested research work in this direction was inaugurated last season, seven methods being tested. This season, 1912, nine tests were made, the new one being "Bluestone and Salt" and a

"1/30 Sheep Dip." With the exception of the formalin, which was used at a strength of 1 in 400 of water, and the bluestone and salt solution, made by dissolving as much salt as possible in the ordinary bluestone solution, the method of preparing the various mixtures and applying appears in Volume XXVIII., Part 1, of "The Queensland Agricultural Journal."

The germination percentage this year is much lower than last season, due to the excessive wet experienced, which soddened the ground and rotted the grain. In order to illustrate how different conditions bring forth different results, and how necessary it is that research work be carried on for a number of seasons before arriving at a decision, the results of this season and last will be given under the different headings in tabulated form:—

GERMINATION PERCENTAGES.

Treatment.	Germination Percentage, 1911.	Germination Percentage, 1912.	Average.
1. Untreated	94	72	83
2. Sheep Dip, 1/80	..	85	85
3. Sheep Dip, 1/30	94	79	86·5
4. Bluestone and Lime	91·8	76	83·9
5. Carb. Wheat Protector	91·8	74	82·9
6. Arsenic	90·7	74	82·3
7. Brine	88·0	76	82·0
8. Bluestone, 2 per cent.	88·5	72	80·2
9. Formalin	84·0	74	79·0
10. Bluestone and Salt	...	78	78·0

Though the germination percentages, as before stated, are considerably lower, the peculiarities of the season have been particularly suitable for testing of the relative values of the treatments for the purpose for which they are intended, as in most instances an increase in the percentage of smutted plants is noticeable, and, happily, the untreated lot shows the largest—nearly 8 per cent. The following results were obtained, those of 1911 being given for comparison, as before:—

Treatment.	Percentage Smutted, 1911.	Percentage Smutted, 1912.	Increase Percentage.	Average Percentage, 2 Years.
Untreated	57·5	65·2	7·7	61·3
Sheep Dip, 1/80	44·3	48·1	3·8	46·2
Sheep Dip, 1/30	No test	44·7	..	44·7
Brine (Sat. Sol.)	37·0	43·4	6·4	40·2
Bluestone	3·3	4·1	·8	3·7
Bluestone and Lime	6·0	1·3	− 4·7	3·6
Bluestone and Salt	No test	2·6	...	2·6
Formalin	None	3·8	3·8	1·9
Arsenic	"	2·7	2·7	1·3
Carb. Wheat Protector	"	1·3	1·3	·6

From results to date, it is quite evident that the salt and sheep dip treatments are of no value, and will not be included in future.

Owing to the many ways in which reinfestation of seed may be brought about, the value of the treatment has been tested in this direction, and the results will be forthcoming next month.

The Orchard.

PINEAPPLES IN THE NORTH.

MR. C. ROSS, Instructor in Fruit Culture, writes:—

I have just received a communication from one of the fruit inspectors in the North, relating his experiences and observations in connection with pineapple-growing in the Russell River district, wherein he states that he interviewed a Mr. Norris, a grower of pines, and, after inspecting and tasting the fruit, declares that its equal in shape, flavour, smallness of core, and absence of fibre, he has never previously seen. The bulk of the crop is marketed at Innisfail, where they have established a distinct reputation. It is stated that the constitution of the plant and the quality of the fruit have been very much improved since the time of introduction into that neighbourhood, so much so that it may be worthy of a distinct appellation and be given a place in a new nomenclature. The original variety was of the smooth type, but has been growing alongside a plot of Roughs, and the opinion is offered that a cross may have taken place (as the variety shows the characteristics of both types). This, however, cannot be taken conclusively; affinity, acclimatisation, &c., may have important bearings; but, unless cross-fertilisation has been effected or a sport originated, the results could not be sufficiently accentuated to produce a distinct new variety. Nevertheless, the variety under notice may be a locally-improved type of one or other of the well-known smooth pines and deserving of separate culture. I would suggest that specimens with leaves and crowns attached be sent to this office for designation.

THE POMELO; GRAPE FRUIT OR SHADDOCK.

BY HOWARD NEWPORT, Instructor in Tropical Agriculture.

The notes in the January issue of this journal on the seedless Siamese pomelo may serve as an introduction for a few further remarks on these interesting fruit.

There has been, and still is, in many parts considerable confusion in the naming of this group of the Citrus family; the terms pomelo (spelt in various ways) and shaddock being more or less synonymous, while local names, such as grape fruit, poor man's orange, seville or marmalade orange, &c., are applied to certain varieties.

The word "pomelo" is said to be derived from the Dutch "pompelmoes," and "shaddock" from an English ship captain of that name, who is said to have carried some varieties of this Citrus family to the West Indies. The term "grape fruit," on account of the habit of some varieties bearing in clusters, is now considered as American, since it has become more generally used there than anywhere, but more probably

originated in Jamaica. "Poor man's orange" may have been given to this fruit because of its seemingly prolific bearing (being in clusters), or because, not being so sweet as the orange or mandarin, it was considered of less value—*i.e.*, cheaper. This name is incorrectly applied to any of the true pomelos, however, for, though it may be difficult to define exactly what the poor man's orange botanically is, the term here is better reserved for a more or less acid, half-wild, probably hybridised, and certainly deteriorated variety of the true orange. The term "Seville or marmalade orange" is a total misnomer when applied to any of these, for, though a very nice preserve may certainly be made from the better varieties of pomelos, it is not marmalade, and the fruit is quite distinct botanically from the *Citrus vulgaris*, and may be readily distinguished by scent, flavour, and consistency.

While the first three names may be reasonably retained therefor, the last two must be discarded as totally inapplicable. Scientifically,

PLATE 11.—GRAPE FRUIT.

the pomelos are known as *Citrus decumana*, a species that includes many varieties (not yet satisfactorily distinguished among themselves by name) having such great differences that, horticulturally, they are recognised and described as quite distinct fruit, but which at the same time cannot be botanically separated.

Mr. H. Harold Hume, of the Florida Agricultural Experiment Station, in an effort to sort out the tangle of names, says: " 'Pomelo' is the name given the preference, 'grape fruit' is synonymous, while 'shaddock' is relegated to a fruit botanically the same as the pomelo, but horticulturally distinct. The term 'shaddock' is more properly applied to the large, pyriform, or necked varieties."

With us in the North of Queensland the term "pomelo" would seem to apply generally to the whole species; while "grape fruit" is the name reserved for the finer varieties, and "shaddock" for the coarser. While

admitting the difficulty in differentiating botanically, horticulturally no such difficulty presents itself. There are a number of varieties of each extant in North Queensland; but all may be readily allotted into one or other of the two groups—grape fruit or shaddock.

The shaddock is the commoner of the two, and probably better known. It is large, sometimes 8 or over 10 in. in diameter, is found growing singly more often than in clusters, has a thick skin with considerable pith, is sometimes but by no means always necked or inclined to be pear-shaped, and, when opened, the pith and rind are often found to be 1 in. and over in thickness; the rag is coarse, tough, and plentiful, while the pulp is full, very firm, and inclined to be "dry" rather than juicy. In flavour it is sub-acid with a bitterness not too pronounced to be pleasant. There are two main varieties of the shaddock here—one

PLATE 12.—GRAPE FRUIT.

having a pinkish tinge on being opened, and the other yellow. The former is the better of the two.

The grape fruit, on the other hand, is seldom over 4½ to 5 in. in diameter, and more often 3½ to 4 in.; generally grows in clusters sometimes up to one dozen on a bunch, is thin-skinned and smooth, and usually orange-shaped or somewhat flattened at top and bottom. When opened, it is found to have very little pith or rag, and what there is is as soft as a fine orange; the pulp is fleshy and exceedingly juicy. In flavour it is neither sweet, sour, nor bitter, but pleasantly sub-acid, and quite as distinct from the flavour of the shaddock as it is from any other citrus fruit.

Trees of both these varieties are to be found in many of our older citrus orchards in the North, but the fruit is, unfortunately, little

appreciated, generally being looked upon as a curiosity rather than an appreciated addition to the table.

In one instance recently at a local agricultural show a plate of really magnificent specimens of grape fruit were found labelled "Seville Oranges, Non-Competitive"; and inquiry elicited the statement that as they looked nice some were sent in "just to help the show along." The fruit in question were by far the best citrus fruit exhibited, and might have taken an honourable position on the show bench of any Southern exhibition. Later, after an explanation of the virtues of the particular fruit, and a demonstration of the proper method of consuming it, the opinion was expressed by the grower that he considered it the finest fruit in his garden.

This very instance is typical of many of our tropical fruit, which to be appreciated must be served and consumed in the proper, even though possibly unusual, manner. Especially is this so in our Australian tropics, where, to popularise really luscious tropical fruit, it would seem that it is not so much an education in taste or flavour that is required as an explanation of the proper method of eating them. Hence it is that Southern tourists visiting Northern Queensland, and accustomed, perhaps, to melons, &c., may not infrequently be seen to carefully consume the flesh of the granadilla and discard the seed and its pulp, with the natural result that it is considered a tasteless, "horrid" fruit, and the popularity and market for one of the most luscious of our products loses an adherent and gains a bad advertisement. Such fruit, for instance, as the avocado pear, the bread and jack fruit, the tree tomato, the egg fruit, the cashew nut, &c., if attempted to be eaten as the same might suggest to the temperate climate resident, would result in disaster—at any rate, so far as creating a taste and demand for the fruit was concerned.

Similarly the pomelo—whether a shaddock or a grape fruit—loses half its relish and all its piquancy if eaten like an orange or mandarin. The proper place for either of these fruit is the breakfast or early lunch table. If a shaddock, it should be peeled by the rind only being cut with a knife and then broken open. The fruit part may then be removed and the quarters separated quite easily; the rag, already mentioned as tough, may be peeled off with any adhering pith, and the quarters, ready for consumption, left intact. These may be placed on a glass dish, and a little castor sugar sifted over it, in which form it will be found to *look* appetising, and, when eaten with fruit knives and forks, and sugared to taste, will be found piquant, refreshing, and with quite a distinct and pleasing flavour of its own. Further, the fruit has distinctly tonic properties, and is, therefore, more than wholesome—it is curative. Nor need the skin or rind be wasted, for it is from the skin of this variety that the pomelo bitters are obtained, and which may also be candied and found a pleasant addition to puddings and cakes.

The grape fruit, on the other hand, will need to be served whole; a fresh bunch of half a dozen or so still adhering to twigs and leaves, without any plate, looks well on the table. When consumed, this fruit should be cut in half across the quarters with a sharp knife, sugar added

to taste, and eaten with a spoon. In this manner the full flavour as well as the juiciness of the fruit will be obtained, and without doubt will be appreciated in Australia as much as it is in America, where its medicinal virtues in cases of dyspepsia are fully recognised, and its tonic properties, coupled as they are with obvious palatableness, are taken the fullest advantage of.

If those who have the opportunity would give these fruit a trial on their merits, and give up any idea that the pomelo was trying to ape the orange (it is no more an orange than the lemon or lime), there is little doubt that it would quickly become popular, and the absence of the taste and consequently small market for this fruit in Queensland—or, indeed, Australia—deplored by the writer of the notes above referred to ("Queensland Agricultural Journal," January, '13, page 28), would give place to a considerable demand. Should a demand eventuate, a

PLATE 13.—GRAPE FRUIT AT INNISFAIL, N.Q.

supply would be at once forthcoming from almost any of the Northern citrus fruit-growing centres, and still more could be readily produced, for the tree is fairly quick-growing and hardy.

Mr. A. H. Benson, the late Instructor of Fruit Culture of the Department, says of this fruit:—"The grape fruit grows well here and bears heavily, but so far there has been no market, or only a very limited one, and at a small price. The best types of grape fruit will keep and ship well. . . ."

North Queensland has no seedless pomelos as yet, but it has some very fine examples of grape fruit, the value of which is not recognised. The illustrations are of a fine tree growing on the south bank of the Johnstone River, on the farm of Mr. Geo. Kerr, of Innisfail, also showing its clustering habit and the consistency of the fruit when opened. The cut specimen was $4\frac{1}{2}$ in. in diameter.

Tropical Industries.

VEGETABLES IN TROPICAL QUEENSLAND.—No. 2.

BY C. E. WOOD, Manager, Kamerunga State Nursery, Cairns.

In talking of vegetables in the tropics, it must not be forgotten that, while to the ordinary Southerner the term "Tropics" means a very hot climate, there are, in reality, parts where the climate is more of a temperate, or at all events, of a sub-tropical nature, so that in a district like Cairns, which includes both highlands—such as Kuranda, Atherton, and Herberton—and lowlands, those immediately on the coast, the range of vegetables that can be produced includes almost every vegetable known to the gardener. Yet, in spite of this fact, there are often periods when vegetables, at all events, any variety of them, are scarcely procurable in Cairns or on the coast. So far as the lowlands are concerned, there are undoubtedly some months when such vegetables as cabbages, lettuces, &c., are hard, if not almost impossible, to produce, especially towards the end of the year and during the wet season; however, even during the hottest and driest months, if water is at hand, as in Cairns, anyone wishing to have a few vegetables can do so, and the work once started, a very short time spent in watering, weeding, &c., every evening is all that is necessary. From April to September, even in the lowlands, most of the ordinary so-called European vegetables can be grown; after this, if cabbages, lettuce, &c., are required, a little more care and study of proper aspect, and more attention generally, are required. With regard to French beans, which are always popular, it appears that, owing to the prevalence of the "bean fly," great difficulty has been found in bringing crops to maturity. Unfortunately, I am not aware of any preventive for this pest. Many experiments have been tried, but so far without effect. Other beans are also attacked by the fly, so that many failures will be met with through no fault of the grower. As French beans generally become scarce (even when fly is absent) towards Christmas and the New Year, a good substitute will be found in the cowpea, especially if the white or clay varieties are planted. Other easily-grown vegetables for the hot season are the butter gourd, a tropical marrow, egg plant, Guada bean, green papaw, mild capsicum, tomato, cucumber, and bush Lima bean.

With regard to cultivation, the method generally adopted appears to be the same both for wet and dry seasons—viz., in raised beds. While this method is undoubtedly the best if the ground is very wet or continual rain falls, during the drier months, beds on the ordinary ground-level are to be preferred, as the evaporation is less and the beds are not so likely to become dry. By a little more careful study of climatic conditions, much labour and disappointment would often be saved.

TONKA BEAN.

BY R. S. NEVILL, Tobacco Expert.

The Tonka or Tonquin Bean (*Dypteryx odorata*) is a native of Cayenne (French Guiana); it is sometimes called the Snuff or Tobacco Bean, and is largely used in the manufacture of all kinds of tobacco, and also in many sorts of perfumes. It seems to me that it could be grown in tropical Queensland, and if it could it would yield large returns.

It is now worth 20s. per lb., and may go higher before it is lower, as the demand is greatly in excess of the supply; and, as tobacco manufacturing expands, the demand will increase. A satisfactory substitute for it has not yet been found, and manufacturers are scouring the world for supplies, and are unable to secure them, and are compelled to use unsatisfactory substitutes. The tree grows from 60 to 80 feet in height, the pod bearing one bean, a little larger than the kernel of an almond and shaped something like an almond. I think it worth while for the farmers above the frost line in North Queensland to give it a trial.

[We have been informed that a Tonquin Bean tree is flourishing at Port Douglas.—Ed. "Q.A.J."]

EXTRACTING SISAL FIBRE.

A NEW IDEA.

Owing to the great cost of sisal scutching machines, various devices have been tried to attain the desired end of extracting the fibre in a marketable condition from the leaves at a minimum of expenditure. One method was to ret the leaves in fresh or salt water, but this entailed long immersion, and proved most unsatisfactory for several reasons, one being the enormous number of leaves required to produce a ton of fibre, the yield being only about 4 per cent. of fibre of the weight of leaves treated. Another objection was, that the fibre extracted in salt water became harsh, dull in colour, and non-elastic, whilst that treated in fresh water, while retaining its firmness and elasticity, always turned out of a dirty brown colour. A third and very serious objection to fresh-water retting was the pollution of rivers or lagoons by the evil-smelling refuse from the leaves.

Mr. W. H. Davidson, of Tambourine Mountain, was led to study this question of water-retting by observing, on the seaside, a complete hand of fibre which he concluded was the fibre from a sisal leaf. The action of small sand-laden waves on the beach, washing the hand to and fro, had completely removed the clinging cellular matter, leaving the fibres absolutely clean and bright, whilst Nature had fined, hardened, and combined the fibres into the thorny terminal spike which is such a permanent feature of the leaves of the sisal plant. On this he remarks:—

"I fancy that the leaves, if first passed between rollers to break up the outer coating, and then subjected, while fresh and soft, to the

scouring action of mixed sand and water in a race with sufficient fall, or in troughs set in a series of steps, would yield a very fine quality of fibre. The leaves would need to be tethered in some manner so that the scouring action of the sand and water would give maximum results. Of course, the whole question is one of cost, but I make the suggestion for what it is worth."

The idea is certainly novel, and possibly might be effective, but there would still be the objection of the great tonnage of leaves to be dealt with; and, in addition, it would be necessary to construct enormous races, supply many hundreds of tons of sand, and then would arise the imperative necessity for a vast permanent supply of water at the race head. This certainly might be supplied from a good waterfall, many of which exist in parts of coastal Queensland, but a fatal objection would render such a scheme impossible, owing to the pollution of the stream below the falls.—Ed. "Q.A.J."

THE WORLD OF FIBRE.

COTTON IN PONDOLAND.

In an article on cotton-growing possibilities in South Africa, "The Standard" has reported a big success in Pondoland. "It has been long known," says our contemporary, "that the Kaffrarian coastbelt was capable of producing cotton in unlimited quantities. A recent exhibit of forty bales at the Agricultural Congress at East London has, however, caused attention to be directed more seriously to the possibilities of the industry than at any time in the recent past. This particular sample was grown by Messrs. Wardlaw and Kirsten on the Big Umgazi, near Port St. John's. The ground is about 70 ft. to 80 ft. above sea level. The average rainfall of the district is about 20 in. No fertilisers were used except in the case of the Sea Island cotton, and the land was in no way exceptional as regards its quality. The results recorded below are, therefore, very striking:—

Sea Island.—5 acres; yield per acre, 1,373 lb.; cost of production per acre, £3 10s.; profit per acre, £13 13s. 3d.

Mitafifi.—3 acres; yield per acre, 1,300 lb.; cost of production per acre, £3; profit per acre, £13 5s.

Toole.—2 acres; yield per acre, 2,061 lb.; cost of production per acre, £3 10s.; profit per acre, £22 5s.

Nyasaland Upland.—3½ acres; yield per acre, 1,585 lb.; cost of production per acre, £3; profit per acre, £16 16s. 3d.

"These profits are estimated on the basis of 3d. per lb. only for the lint, and without any reference to the value of the seed, for which there is a demand at about £5 per ton. The experiment was carried out under the direction of Mr. Van Ryneveld, one of the cotton experts in the employ of the Agricultural Department, and his conclusions are understood to be entirely favourable to the prospect of establishing the industry upon a commercial scale."—"Rubber World."

[There appears to be some discrepancy in the above figures. On a basis of 3d. per lb. for seed cotton, a yield of from 1,373 lb. to 1,585 lb. would not give such profits as are above shown, unless the yields mentioned were all lint, which is impossible. In Queensland yields of 2,000 lb. of seed cotton per acre were not uncommon, and in one case 2,000 lb. were taken off and much of the cotton was left unpicked. Probably the values above were taken at the seller's value—say, Sea Island at 9d. per lb., and Uplands at 7d.—Ed. "Q.A.J."]

FINE HARD PLANTATION RUBBER.

MR. WICKHAM'S MACHINES.

The "Ceylon Observer" (says the "Rubber World") gives the following description of Mr. Wickham's automatic apparatus for the production of Plantation Fine Hard. The "Observer" says:—"The rubber is prepared from pure whole latex without the use of a coagulant other than the application of smoke and heat. The model Mr. Wickham has set up at the experiment station, Peradeniya, is very simple in construction and can be worked by two men. It is a treadle machine with a cylinder, which is worked by a single shaft. The cylinder keeps revolving all the time, and into it drips the pure strained latex, straight from the field, which is stored in a can with a tap. The latex, no sooner it drips into the cylinder, is dried somewhat by the hot smoke which a funnel emits into it. The requisite heat is from 160 to 200 degrees, and should not exceed 200 degrees. Before the latex is allowed to drip into the cylinder, the cylinder is heated by the heat emitted from the funnel, the mouth of which is placed about 2 in. away from the base of the cylinder. The funnel, which is about 4 in. in diameter, can be shifted as required. The rubber comes out of the cylinder dry and in the shape of a belt about 4 in. in width. The 'belts' are then allowed to hang out in the lines till they are blocked. The fuel used is the shell and husk of the coconuts. This principle of curing is the same as in case of that of the Amazon product, but Mr. Wickham's apparatus offers a more efficient means than the primitive utensils of the Amazon for the preparation of 'fine hard cured' rubber.

"All the latex as obtained from the tree enters into the rubber, without residue, excepting a small quantity of moisture. The percentage of moisture contained in the rubber prepared in the Wickham automatic apparatus is in the neighbourhood of 10—probably less rather than more. The rubber turned out by the apparatus consists in a series of superimposed laminæ or films, each of which is superimposed upon its neighbour during the process, and each film or lamination is individually treated and cured by the smoke impingement.

"Keen interest is being shown in the apparatus, and advices received from New York and London state that the samples of rubber sent for test are the nearest approach to fine hard Brazilian Para that has yet been sent from Eastern plantations. A consignment of about half a ton will probably be sent to England in the near future, to enable

a definite decision to be made. It is just possible that the demand which has arisen for rubber in a smoked sheet form may serve as an introduction to smoke-cured rubber in the form made by Mr. Wickham."

SISAL HEMP AT ST. HELENA.

Last month a further consignment of nearly 4 tons of splendid sisal fibre (the produce of less than 3 acres) was sent from the farm at the St. Helena Penal Establishment to Messrs. Forsyth's rope works at Kangaroo Point. So far, the island plantation and that of Mr. Wells, at Childers, have been the only producers of this valuable fibre, although there are some plantations both in the Southern, Central, and Northern Districts, which have not yet arrived at the producing stage, and experimental plots at various places inland have been commenced by the Department of Agriculture and Stock. A very few years should see a marked increase in the production of sisal fibre. Prices have of late been good. On 13th November, Landauer's Market Report, London, quoted £37 10s. to £38 for first quality. On 27th November, prices fell to from £33 10s. to £36 5s. On 4th December, Mexican sisal was sold at £35; and German East African at £36 10s. to £37. The decline in prices was attributed by Messrs. Landauer to manipulations by certain interested parties. The market for Mauritius Hemp was very firm in December. Prime quality was unobtainable, and spot values were firm at £27 to £27 10s. for good fair, and £23 10s. to £24 for ordinary grades.

China Grass fibre was worth £55 per ton, and so much is required locally and in Japan that it becomes more difficult each year to supply European consumption, so much so that European consumers are not likely to get this article again except at very much higher prices than those previously ruling. The sudden fluctuations in the hemp trade also affected Manila Hemp. Under pressure in "bear" selling, the market in November had suffered a decline of £3 to £4 per ton, but the situation was suddenly changed. The "bears," finding it impossible to cover their commitment from shippers, quickly changed their colours, and purchased freely all available parcels, with the result that prices quickly advanced no less than £3 per ton.

COCONUTS IN THE NORTH.

Of late there has been some inquiry from the Northern districts as to the possibility of growing coconuts and producing coprah and coir fibre in competition with the industry in countries where it is carried on by the help of black labour. The "Queenslander" of 11th December, 1913, published the following notice of the work of Mr. H. Matzat in the Port Douglas district, and the accompanying illustrations of his operations are taken by permission from that journal:—

"Mr. H. Matzat, who has a coconut plantation near Port Douglas, has a very high opinion of coconuts as a crop for the North. He considers that it offers better means of settling the Northern areas than any

COCONUTS (THREE YEARS OLD), AND COTTON.

COCONUTS BEARING FRUIT CROP.

PLATE 14.—COCONUTS GROWING AT PORT DOUGLAS.

other crop. Cotton, coffee beans, rubber, bananas, rice, corn, and cattle require too much labour. The drawback is the long wait—eight years—before the trees come into bearing. To overcome this difficulty he thinks it would be advisable for the Government to advance 1s. per tree per year, which would enable growers to plant trees without danger of getting into the hands of the storekeepers or of starving. He points out that the Mosman mill cost £120,000, a sum that would bring 300,000 trees into bearing and keep 100 settlers on ground that was now deserted, and bring in double the financial return. Mr. Matzat said he had had a

PLATE 15.—HARVESTING CASSAVA, PORT DOUGLAS.

hard time in getting his plantation into good order, owing to losses from bush fires, &c., but he valued his property now at £5,000.

"In a communication to the Department of Agriculture and Stock, Mr. Matzat supplied some interesting information regarding the industry on which he has embarked. His trees, he says, will bear 200 nuts or more a year, which will yield 1 cwt. of coprah, equal to about £1 per tree per year. [These estimates are far too optimistic.—Ed. 'Q.'] He has 3,000 trees in various stages of growth. The trees continue in full bearing about fifty years. The nuts can be harvested by a man with a wagon. The nuts are brought to near a shed, where they are split open, and the white part exposed to the sun, after which the white part

is removed from the shell and placed in a shed to dry. They must not have rain or dew on them or they will grow a fungus. One man can make more than 1 ton of coprah per week.

"Mr. Matzat has shown great energy and perseverance on his holding. He has built a house of good timber, and constructed so as to stand the force of cyclones, which are experienced in the region in which he lives. He has also built a number of other structures required in connection with his farm. He has also gone in for cotton and Soya beans. The coconut plants draw great sustenance from a creeping clover which covers the ground, and the value of which, he said, was not generally recognised. The coconut trees grown near this creeper extend their roots to reach them, and give incomparably better returns than those standing near grass."

[We note the editor's remark that Mr. Matzat's estimate of over 200 nuts per tree a year is far too optimistic. We quite agree with this. It is reckoned in Ceylon, Papua, and other coconut-growing countries, that an average of 50 to 60 nuts per tree is a fair return. Certainly, there is a tree at Samarai, Papua, which last year bore 200 nuts; but this is exceptional. Three thousand trees at 200 nuts per tree would yield 600,000 nuts, and, as it takes about 5,000 nuts to produce 1 ton of coprah, those trees would represent 120 tons of coprah annually, worth £3,000, or £1 per tree. A properly planted acre carries 50 trees, so that 3,000 trees would cover 60 acres, and the value of the produce (coprah at £25) per ton would be £50 per acre. Taking the cost of white labour (including an overseer) in Queensland, the cost of gathering, husking, and splitting the nuts, drying, and extracting the meat would come to about £18 to produce 1 ton of coprah, the profit on which would be £32 per acre.—Editor "Q.A.J."]

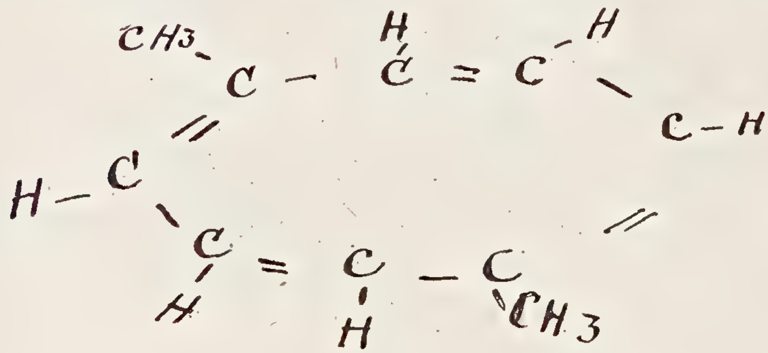
SYNTHETIC RUBBER.

For many years (says the "Philippine Agricultural Review") the rubber planter has dreaded and dreamed of the terrible *bête noir* of artificial rubber; and, while there is no immediate need for the practical planter to fear that his work is in vain, it is certain that a large stock company to exploit synthetic rubber in Europe has just been floated.

By the same token synthetic rubber may not be very elastic and it may, at the present writing, be rather expensive, but the cold and rather lugubrious fact is that common corn or potato starch can be fermented so that it yields methyl alcohol (which is vulgarly known as fusel oil) and acetone, and from this first process isoprene can be obtained, which,

in turn, after two or three other manœuvres, produces "dimethylcyclo-öktadiene," or whatever the chemists now prefer to call it. In other words, starting with common starch at some 10 cents per kilo, and a moderate amount of salt, lime, and, of course, coal, artificial rubber can be, and is, actually produced.

This terrible word was referred for explanation to Mr. J. C. Brünnich, Agricultural Chemist, who states that "dimethylcycloöktadiene" is a compound with eight carbons in a ring most likely like this:—



After this it cannot be wondered at that the world still awaits, and is likely to await, the advent of synthetic rubber.

MARKET GARDENING.—A NEW VARIETY OF CUCUMBER.

A few years ago there was introduced into Queensland a variety of cucumber, which had more the appearance of a small round rock melon than of the usual long type of cucumber. For some reason or other, it went out of the market, and only lately has been revived by Mr. E. C. Holland, of Redbank Plains, who obtained the seed from Messrs. Chas. Taylor and Co., Brisbane, under the name of "German Apple Cluster" Cucumber. Mr. Holland has been very successful in the cultivation of this variety, and has also induced many to try it, with the result that it has become a general favourite in the Goodna and Ipswich district, where the fruit sells readily at 6d. per dozen retail. It is a most prolific bearer, every joint of the vine producing from 3 to 5 fruits, in many cases double fruits, as may often be seen in the case of bananas. It was known in times past as the "Chinese Apple" Cucumber, which bore no affinity to the corrugated, hard Japanese variety. It may easily be mistaken for a small smooth rock melon. One great point in its favour is, that the pumpkin beetle will scarcely trouble the vines. Mr. Holland has destroyed hundreds of beetles on other varieties of cucumbers, melons, &c., but scarcely any have attacked the apple cucumbers.

Botany.

CONTRIBUTIONS TO THE FLORA OF QUEENSLAND.

BY F. MANSON BAILEY, C.M.G., F.L.S., COLONIAL BOTANIST.

Order MYRTACEÆ.

BÆCKEA, Linn.

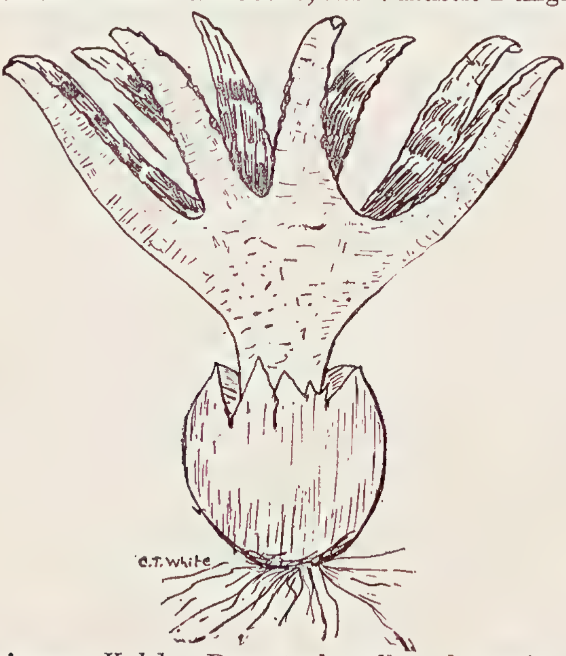
B. camphorata, *R. Br.* in Bot. Mag. 2694; *Benth.*, Flora Austr. IV., 81.—An erect shrub with virgate branches. Leaves linear-oblong or slightly cuneate to broadly oblong or almost obvate, flat, obtuse or nearly so, 1½ to 3 lines long. Flowers rather small, solitary or in clusters of 2 or 3 on short pedicels with concave very deciduous bracteoles at the base, without any conspicuous common peduncle. Caly-tube campanulate, not 1 line long; lobes small, broadly ovate, petal-like, half as long as the petals. Petals about 1½ line long, almost clawed. Stamens over 10 to 15, none opposite the centre of the petals; filaments filiform; anther-cells nearly globular, but parallel and opening more or less deeply in longitudinal slits. Ovary flat-topped, 3 celled, with 10 to 20 ovules in each cell round a small slightly peltate placenta; style inserted in a deep tubular central depression. Capsule slightly convex.

Hab.: Eidsvold, *Dr. Thos. L. Bancroft.*

Order FUNGI.

ANTHURUS, Kalch.

Receptacle stipitate, or with a very short stem, divided above into erect patent laciniæ, free at the apices, but running down direct into the stem, and not distinct from it.—*Cooke*, Hbk. Austr. Fungi, 216.



A. Mullerianus, *Kalch.*—Receptacle yellow, becoming reddish, below the middle stem-like, about the base scarcely 5 m.m. thick, above cup-shaped or funnel-shaped, dilated, margin over an inch broad, divided into eight distant laciniæ, separated by a rounded sinus about ¾-in. long, erect, patent, apex recurved, inner face red and rugose.—*Cooke l.c.*

Hab.: In a fowl-yard, Brisbane, *J. F. Bailey.*

Statistics.

RAINFALL OF QUEENSLAND.

TABLE SHOWING THE TOTAL RAINFALL FOR EACH MONTH OF THE YEAR IN THE AGRICULTURAL DISTRICTS OF QUEENSLAND.

STATIONS.	1911.	1912.											
	Dec.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
North.													
Atherton	...	...	...	...	...	...	...	...	...	...	...	1·11	1·72
Ayr	...	...	...	3·53	1·16	1·01	6·70	...	...	Nil	·46	1·51	0·14
Bowen	1·32	1·56	3·15	1·86	0·59	1·76	3·78	...	0·18	Nil	2·46	1·00	0·86
Cairns	0·90	4·81	16·68	5·95	4·71	5·97	8·00	...	2·89	0·75	2·25	1·54	1·71
Geraldton (Innisfail)...	0·75	5·50	18·24	6·01	56·14	41·84	15·25	...	3·39	2·65	1·58	2·40	1·53
Gindie State Farm ...	3.50	0·68	2·59	1·88	0·63	...	9·94	3·45	...	Nil	1·54	2·17	2·17
Herberton	5·36	5·29	2·82	1·47	1·40	2·20	2·36	...	1·30	0·53	·78	1·37	3·00
Hughenden	0·69	5·78	1·84	3·52	Nil	0·74	6 64	...	Nil	0·13	Nil	2·29	0·55
Kamerunga State Nurs.	...	...	...	...	*	...	...	...	...	...	...	...	...
Mackay	0·41	2·08	8·04	·93	3·56	3·42	5·51	...	0·23	0·2	7·28	3·03	1·66
Mossman	3·31	6·06	18·32	17·60	6·40	2·78	8·88	1·33	1·98	1·80	5·49	6·88	1·90
Rockhampton	0·81	2·50	3·24	·14	0·01	1·98	8·38	...	Nil	Nil	6·87	1·45	2·83
Townsville	2·84	1·64	7·57	6·35	4·51	0·63	4·49	...	0·17	Nil	·64	2·69	1·38
South.													
Brisbane	1·94	1·85	2·13	1·03	0·72	0·20	7·22	...	1·32	0·43	5·85	3·69	5·20
Sandgate	...	...	...	...	...	...	...	...	...	...	...	4·25	5·38
Bundaberg	2·98	3·96	2·47	...	Nil	1·33	10·23	1·76	0·78	0·22	3 74	3·14	1·01
Bungeworgorai (Roma State Farm)	...	0·73	...	2·19	Nil	...	7·06	...	0·33	0·22	1·96	2·2)	...
Crohamhurst	3·02	5·62	8·72	13·73	1·77	1·39	9·99	1·67	1·35	0·19	6·66	4·21	8·24
Dalby	1·55	1·76	2·58	·53	Nil	Nil	4·76	...	0·68	0·87	3·36	1·98	1·18
Esk	0·44	1·38	8·26	·22	0·36	0·11	7·43	...	1·13	0·52	2·57	3·80	3·88
Gatton Agric. College	1·90	3·56	3·31	7·86	1·35	...	6·63	1·84	1·04	0·53	4·99	2·59	3·97
Glasshouse Mountains	1·44	3·37	6·99	13·15	0·31	0·98	7·85	1·86	1·14	0·8	6·60	4·38	...
Gympie	2·10	2·92	4·47	·15	0·37	0·52	2·63	...	0·92	Nil	2·94	2·28	2·49
Ipswich	...	1·87	3·00	·41	0·30	Nil	3·93	...	1·02	0·49	4·04	3·34	2·74
Maryborough	4·98	2·39	3·93	·11	0·32	1·09	9·12	...	1·26	Nil	5·54	4·07	3·36
Roma	1·19	0·74	0 76	·85	0·03	Nil	7·96	...	0·77	0·28	1·95	2·81	0·54
Tewantin	2·13	5·60	4·25	·85	0·80	8·46	8·72	...	0·82	Nil	6·02	4·68	3·19
Toowoomba	...	...	...	·52	0·66	0·16	6 75	...	1·05	1·08	5·41	2·05	3·91
Warren State Farm ...	...	0·82	1·75	2·04	0·22	1·28	9 51	3·35	...	...	...	...	0·75
Warwick	0·70	1·57	3·45	·56	0·02	0·9	5·69	...	1·37	1·50	3·75	2·65	2·37
Woodford	...	...	...	...	...	...	9·78	...	...	0·53	6·78	2·52	4·83
Yandina	1·87	5·95	4·84	·95	0·88	1·39	7·42	...	1·25	0·18	5·7	...	1·30

NOTE.—The rainfall data in this table are compiled from telegraphic reports, and must be considered as approximate only. * No Report.

GEORGE G. BOND,
Divisional Officer.

COMMONWEALTH METEOROLOGY.

RAINFALL IN QUEENSLAND DURING THE YEAR 1912.

The following statement of the total rainfall, as recorded at the various meteorological stations in Queensland for the year 1912, will doubtless prove of interest to many of our readers. Rainfall spells prosperity for the entire community, and with a short interregnum of dry weather the year 1912 has been generally blessed with an abundance of moisture which has been instrumental in keeping the stock routes open, dams and rivers full, and in bringing forth abundance of feed for stock. The new year has opened with propitious weather conditions, and there is every prospect of a favourable wet season. Would that it were financially possible to retain some portion of the heaven-sent water

in the Western districts as a provision for the time when the heavens are as brass and the earth does not bring forth its increase. Some nine years ago we showed how this could be accomplished on the Warrego, and we again draw attention to the possibilities of water conservation in that part of the State:—

PENINSULA.	
Cape York	46·98
Coen	25·10
Fairview	27·32
McDonnell	33·43
Mein	38·21
Moreton	34·52
Musgrave	28·66
Palmerville	28·91
Thursday Island	61·54
Walsh River	26·40

NORTHERN COAST.	
Atherton	36·06
Cairns	63·79
Cardwell	74·20
Clarke River	25·53
Cooktown	58·57
Herberton	26·15
Ingham	87·59
Innisfail	174·30
Port Douglas	59·59
Townsville Pilot Station	31·42

CENTRAL COAST.	
Ayr	22·17
Bloomsbury	33·93
Bowen	18·16
Charters Towers	20·33
Mackay	42·37
Marlborough	32·58
Mount McConnell	14·94
Nebo	17·18
Ravenswood	16·21
St. Lawrence	27·20

SOUTHERN COAST.	
Banana	24·95
Boonah	41·08
Bundaberg	36·14
Bustard Head	29·96
Camboon	22·81
Cape Capricorn	28·97
Cape Moreton	52·15
Childers	37·62
Double Island Point	50·99
Dunwich	56·61
Eidsvold	24·47
Esk	39·62
Gayndah	27·86
Gladstone	32·21
Gympie	31·21
Hawkwood	20·72
Ipswich	32·27
Kilkivan	23·54
Maryborough	46·47
Miriam Vale	38·44
Mount Morgan	32·02
Mount Perry	29·20
Nanango	28·24
Rockhampton	33·30

SOUTHERN COAST—*continued.*	
Rosedale	39·15
Sandy Cape	44·74
Sea Hill	32·73
Southport	32·08
St. Helena	42·45
Tallebudgera	35·01
Tewantin	54·47
Westwood	28·21
Woodford	47·74
Yandina	43·71

DARLING DOWNS.	
Cambooya	26·84
Chinchilla	26·59
Dalby	23·04
Goondiwindi	20·61
Inglewood	24·93
Killarney	24·90
Miles	27·63
Pittsworth	24·31
Stanthorpe	28·23
Texas	22·13
Toowoomba	40·45
Wallangarra	27·90
Warwick	28·25

METROPOLITAN.	
Brisbane	41·29
Sandgate	36·10

CARPENTARIA.	
Burketown	16·36
Cloncurry	17·47
Croydon	26·46
Donor 's Hill	24·05
Floraville	20·12
Georgetown	19·02
Gilbert River	20·83
Granada	10·91
Hughenden	21·99
Karumba	33·27
Mackinlay	15·47
Mount Surprise	21·72
Normanton	36·26
Pentland	14·91
Richmond	15·74
Tate River	21·04

CENTRAL.	
Alpha	25·27
Aramac	14·73
Barcaldine	17·20
Blackall	16·90
Clermont	43·78
Dingo	28·23
Emerald	23·88
Isisford	12·39
Jericho	15·43

CENTRAL—*continued.*

Lochnagar	18·76
Longreach	14·23
Muttaburra	18·31
Rolleston	25·17
Springsure	24·88
Tambo	14·34
Tangorin	16·88
Taroom	26·98
Twin Hills	23·20

WESTERN.

Ayrshire Downs	12·79
Boulia	10·82
Camooweal	13·88
Jundah	10·92
Kynuna	11·96
Lake Nash	10·01
Urandangie	8·27
West Leichhardt	14·52
Windorah	7·36
Winton	16·47

FAR SOUTH-WEST.

Adavale	8·78
Thargomindah	5·57

WARREGO.

Augathella	19·60
Bollon	10·47
Charleville	13·93
Cunnamulla	8·60
Dirranbandi	14·88
Eulo	8·04
Hebel	12·03
Morven	18·71
Wyandra	9·98

MARANOA.

Mitchell	25·54
Roma	20·51
Yeulba	23·86
Surat	29·90

TIMES OF SUNRISE AND SUNSET AT BRISBANE—1913.

Date.	January.		February.		March.		April.	
	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	4·57	6·46	5·21	6·42	5·40	6·20	5·57	5·46
2	4·58	6·46	5·22	6·41	5·41	6·19	5·58	5·45
3	4·58	6·46	5·22	6·41	5·42	6·18	5·58	5·44
4	4·59	6·46	5·23	6·40	5·42	6·17	5·59	5·43
5	4·59	6·46	5·24	6·40	5·43	6·16	5·59	5·42
6	5·0	6·47	5·25	6·39	5·44	6·15	6·0	5·41
7	5·1	6·47	5·25	6·38	5 44	6·14	6·0	5·40
8	5·2	6·47	5·26	6·38	5·45	6·13	6·1	5·39
9	5·2	6·47	5·27	6·37	5·45	6·12	6·1	5·38
10	5·3	6·47	5·28	6·36	5·46	6·11	6·2	5·37
11	5·4	6·47	5·28	6·36	5·46	6·10	6·2	5·35
12	5·5	6·47	5·29	6·35	5·47	6·9	6·3	5·34
13	5·5	6·47	5·30	6·34	5·48	6·7	6·3	5·33
14	5·6	6·47	5·30	6·33	5·48	6·6	6·4	5·32
15	5·7	6·47	5·31	6·33	5·49	6·5	6·4	5·31
16	5·8	6·47	5·32	6 32	5·49	6·4	6·5	5·30
17	5·9	6·47	5·33	6·31	5·50	6·3	6·6	5 29
18	5·9	6·47	5·33	6·30	5·50	6·2	6·6	5·29
19	5·10	6·46	5·34	6·29	5·51	6·1	6·7	5·28
20	5·11	6·46	5·35	6·28	5·51	6·0	6·7	5·27
21	5·12	6·46	5·35	6·28	5·52	5·59	6·8	5·26
22	5·12	6·46	5·36	6·27	5·52	5·57	6·8	5·25
23	5·13	6·46	5·37	6·26	5·53	5·56	6·9	5·24
24	5·14	6·45	5·37	6·25	5·53	5·55	6·9	5·23
25	5·15	6·45	5·38	6·24	5·54	5·54	6·10	5·22
26	5·16	6·45	5·38	6·23	5·54	5·53	6·10	5·21
27	5·17	6·44	5·39	6·22	5·55	5·52	6·11	5·20
28	5·17	6·44	5·40	6 21	5·55	5·51	6·12	5·19
29	5·18	6·43	...	...	5·56	5·50	6·12	5·18
30	5·19	6·43	...	...	5·56	5·48	6·13	5·17
31	5·20	6·42	...	...	5·57	5·47	...	...

PHASES OF THE MOON.

			H. M.
7 Jan.	●	New Moon	8 28 p.m.
16 „	☾	First Quarter	2 2 a.m.
23 „	○	Full Moon	1 40 „
29 „	☽	Last Quarter	5 34 p.m.
6 Feb.	●	New Moon	3 22 p.m.
14 „	☾	First Quarter	6 34 „
21 „	○	Full Moon	12 3 „
28 „	☽	Last Quarter	7 15 a.m.
8 Mar.	●	New Moon	10 22 a.m.
16 „	☾	First Quarter	6 58 „
22 „	○	Full Moon	9 56 p.m.
29 „	☽	Last Quarter	10 58 „
7 Apr.	●	New Moon	3 48 a.m.
14 „	☾	First Quarter	3 39 p.m.
21 „	○	Full Moon	7 33 a.m.
28 „	☽	Last Quarter	4 9 p.m.

Irrigation.

WATER CONSERVATION FOR THE WESTERN DISTRICTS.

THE WARREGO AND ITS POSSIBILITIES.

BY THE EDITOR.

Although the following notes were penned at the time when what may be called a seven-years' drought in the West terminated in 1902, the conditions on the Warrego as far as the conservation of water is concerned remain practically the same as when I visited the Western country during that serious drought. But the facilities for utilising the river as a reservoir are to-day much greater than they were in 1901.

I have frequently pointed out that there are very extensive tracts of excellent agricultural land all the way from the Darling Downs to Thargomindah. There is exceptionally good land on the Warrego, admirably adapted to wheat-growing and, indeed, to the cultivation of all cereals and root crops. There are thousands of acres of such land; and, if only a regular rainfall could be depended on, I believe that astonishing crops of wheat and of wheaten and oaten hay could be produced here. I know that 40 bushels of wheat and 4 tons of oaten hay per acre have been obtained by several growers who irrigated their crops. If two or three men can do this, why not two or three hundred? Why not two or three thousand? Where are the wheatgrowers of the future to get land? Although there are large areas of rich land open to selection on the Darling Downs, there is no longer any cheap land there—that is, land cheap enough to grow wheat on, unless it be in the prickly-pear areas, where the soil is all that can be desired, but where the prickly pear defies the efforts of man to eradicate it cheaply. The wheat farmer must have cheap land if wheatgrowing is to yield him a good profit. To get such land, he must go West, whether it be west of Rockhampton or west of Brisbane. Already the pioneers of the industry are at work on the Central-Western lands. Wheatgrowing may be almost looked upon as an established industry there. The pioneers are also out in the south-west, beyond Roma, and even beyond Charleville, out on the Warrego. Thirty miles from Cunnamulla is Longlands, the property of an enterprising man, Mr. O'Connor, who has practically shown that excellent milling wheat can be produced, in time of drought even, by irrigation. I am almost inclined to the belief that irrigation can be conducted as cheaply on the Warrego as in the country beyond the Belyando, Barcoo, and Thomson Rivers. The Warrego bores, and those in the country further west, are certainly more costly to put down, but they yield such vast volumes of water that much more extensive tracts of land can be irrigated by them than by those, say, of Barcaldine, where the yield of water rarely reaches 700,000 gallons in twenty-four hours.

Where, in one case, 500 acres can be irrigated by one bore, in the other only 50 acres can be dealt with per bore, or at most 100 acres, and

the work connected with the distribution of the water is, comparatively to area, just as expensive or inexpensive in the two cases. I shall show directly what can be done on the Warrego by intelligent agriculturists and by scientific application of water to the land.

But, independently of the bores, there is an opportunity presented on the Warrego for the storage of vast quantities of water, which would amply suffice for the needs of hundreds of wheatgrowers, if only some very wealthy speculator could be induced to take up the scheme. It is this: The course of the Warrego, from its sources in the main dividing range beyond Augathella to a point about 8 or 10 miles below Cunnamulla, is about 350 miles, and throughout the whole of this distance there is everywhere as fine soil for wheatgrowing as the most fastidious farmer could wish to put the plough into. Even after the most terrible drought which has ever been recorded since Sturt's time, there were in 1902 splendid reaches of deep water at short intervals all along the river's course. As for the river in flood time, it is then really a river and a grand one throughout. It did not appear to me as if the river had much fall, as the waters scarcely moved southward even in the longest reaches. Now, can anything be done to store this water, which now practically goes to waste? Yes; and at an outlay small indeed in comparison with the benefits to be derived from the work, both by the State lessee and by the State itself. A sum of from £60,000 to £70,000 would erect head works among the deep valleys at the sources of the river. Then about ten overshot dams would be needed. These would cost about £3,000 each. The expenditure of £100,000 would retain all the vast volume of water which now goes to waste every year.

It is worthy of note that no single year has gone by without one or more freshes occurring in the river, even during the drought. Hence, farmers need be under no apprehension of ever being short of water for irrigation purposes. Nor need the weather be any source of anxiety to him. The river and the pumping stations would relieve him of all necessity for rain. Undoubtedly, occasional showers and cloudy skies are helpful, but the experience in the Central districts has been that heavy crops can be produced in the driest years without a single shower. And it is not alone the agriculturist who would thrive, but the graziers also—the men who, in former days, abhorred the idea of farmers coming in on their rich land—would benefit by being able to grow fodder crops and hand-feeding their sheep, as was done by Mr. Gatenby, at Jemalong Station, in New South Wales, or by merely irrigating certain areas of their grass land. In the Jemalong case, seventy-five sheep were kept in perfect condition on a single acre of lucerne, or, as in the experiment, 1,680 sheep throve on 22½ acres of lucerne cut and fed to them. When this can be done, where is the sense in taking up from 10,000 to 20,000 acres of land, of which it takes from 5 to 10 acres of the natural grasses to feed one sheep? That great experiment of Mr. Gatenby's, carried out a second time by the New South Wales Department of Agriculture, and which is, therefore, certified to as correct, must convince the most sceptical that, given water conservation, droughts of the future need not be feared. And drought will occur again and again. There is not

the slightest doubt about that. Would it not, then, be wise to prepare for them, and does it not seem the acme of folly, when good rains have come and grass is growing all over the country, to rest content in a fool's paradise, and cry "Safe!" when there is no safety? Even with all the magnificent grass now so abundant, there is no safety, for there is not sufficient stock to keep it down. Towards the end of winter, it is possible, indeed highly probable, that extensive bush fires will sweep from end to end of the country; and what will then happen? With 300 acres of good land under irrigation, 10,000 sheep could be fattened. At Barcaldine, on ordinary couch grass—irrigated—Mr. Cronin fattened from eight to ten sheep per acre.

As for the waterholes of the Warrego, they may be seen at every few miles. Just below Charleville there is a fine stretch of water. Between that and Dillalah there are two or three, and several between Murweh and Claverton, and on past Coongoola to and far beyond Cunnamulla. If a 10-foot overshot dam were erected at Kane's Crossing, 4 miles below Cunnamulla, so level is the land that that single dam would throw the water back for over 30 miles. When that water is dammed back, a sand dredge would easily remove the sand which is now obliterating what, at one time, must have been a deep, noble river. The width of this stream would be about 3 chains and the depth of water 10 feet. That means that over 1,900,000,000 gallons would be safely retained. With several such dams along the course of the river, and with head works which together would retain 10,000,000,000 gallons of water, there would be no fear of farmers or graziers ever running short of water for irrigation. I think that, with some such scheme of water conservation for the whole West, Queensland could be made the granary not only of Australasia but of Great Britain as well.

Now, of course, the vital question has to be asked:

WILL IT PAY TO GROW WHEAT 600 MILES FROM A SEAPORT?

I think I answered that question very fully in my report on irrigation and wheatgrowing in the Central districts, so I need not repeat the arguments here. The other questions which the Western man can ask and answer for himself are:—

1. "*How much does the flour cost which is annually consumed on the station, the grazing farm, the ordinary household?*"
2. "*Could I get my flour cheaper if the wheat were grown here in sufficient quantities to keep a small flour-mill going?*"
3. "*What has it cost me for corn and fodder imported from other States and countries to keep my stock alive?*"
4. "*Could I have done it cheaper if farmers here grew quantities of fodder by irrigation?*"

The last two questions can be answered by what has actually been done in the Warrego district by a station manager. On that station enormous sums had to be paid for corn, &c., to keep the sheep alive. Chaff was worth £20 per ton in Charleville. A cheap line of chaff came into the hands of an agent in one of the Western towns on the Warrego,

and it was offered to the station manager at £10 per ton. He was one of those sensible men who had seen the possibilities for agriculture in the district, and had ploughed and sown a considerable area of land for fodder. He, therefore, declined to pay £10 per ton for an inferior article when he could grow much better for £1 per ton. Is not this a good argument in favour of irrigation farming? The farmers could grow the fodder, and the graziers would take it off their hands at good prices rather than lose 50 per cent. of their flocks and herds, or rather than go to the trouble of cultivating some of their own land.

It may be interesting to some of the readers of this sketch, who are unacquainted with the Western country, to learn something concerning

THE STATIONS AROUND CUNNAMULLA.

BURRENBILLA.—This station is about 5 miles south of the town, and is owned by Cobb and Co. The manager is Mr. Webster. There are three bores on the property, each yielding over 3,000,000 gallons daily. No cultivation to speak of.

COONGOOLA.—Situated 30 miles north of Cunnamulla. Owners, Armstrong Bros.; manager, J. J. Armstrong. The homestead is on the Warrego River. There is a railway siding, and, as far as I know, only one bore, which is said to yield 7,000,000 gallons per day. It is 1,700 feet deep, and the water is carried for miles over grass land.

YARMOUTH.—Thirty miles east of Coongoola. Owners, W. Clarke and Co.; manager, G. Farlow. The bore yields 4,000,000 gallons per day. There is no cultivation. The country is principally mulga.

ELVISTON.—Near Yarmouth. Mr. Rookes is both owner and manager. The bore on the property gives 4,000,000 gallons. I do not know whether he cultivates any of the land.

ELMINA.—About 15 miles east of Elviston. Messrs. Fletcher Bros. are the owners, and they manage the property themselves. Here also there is a bore with a heavy flow. The country is mulga. I could not learn that any cultivation is done here.

TINNENBURRA.—Close to Barrungun, 75 miles from Cunnamulla. This property belongs to the Tyson estate; manager, Mr. McDonald. The station is well watered by the Warrego and also by several bores.

THURULGOONA AND BUNDALEER.—Owners, the Squatting Investment Company; manager, Mr. McVean, with a sub-manager at Bundaleer. There are several bores on the property, varying in flow. Last year many acres were irrigated for wheaten hay, of which hundreds of tons were produced during the drought. Previous to this cultivation being undertaken, all fodder needed for the stock was purchased at enormous expense. Last year the fodder only cost the owners £1 per ton or thereabouts. The hay crop, I was told, averaged 3 tons per acre, and the cost of production was said to be £2 per acre. This year a much larger area is cultivated. There are several stacks of last year's crop still standing.

CHARLOTTE PLAINS.—Twenty-five miles from Cunnamulla, on Widgeegoara Creek. Owners, estate of McDonald Bros.; general travelling manager, Mr. Gorig; resident manager, Mr. Ivory. A splendidly

managed property. There are two grand bores here, each with a flow of 4,000,000 gallons, but no cultivation is done. About 45,000 sheep were being shorn last March.

WEELAMURRA.—Twelve miles south farther down the Widgeegoara. Owners, estate of G. King; manager, Mr. E. King, who is chairman of the Paroo Divisional Board, or rather shire. There are two good bores here, at both of which some cultivation is carried on. Fodder grasses are produced, especially Johnson grass and Paspalum, which thrive amazingly.

AVONDALE AND WIDGEEGOARA.—Owners, Goldsbrough, Mort, and Co.; manager, John Bignell. There are two bores, but I heard nothing of any cultivation here.

CAMDEN PARK.—Same owners. J. F. Frazer, manager. There is a splendid bore, but no cultivation is done worthy of the name. About 15,000 sheep were about to be shifted for want of grass (March, 1901). The welcome rains, however, occurring about a week later, probably obviated the necessity for this step. Yet there is a splendid water supply, and there is also the example of Mr. Gatenby's experiment before spoken of. How much cheaper could those 15,000 sheep have been fed here than at Jemalong? No steam to get up, no engineer required, no fuel to pay for. All that is needed is to plough the land, sow the seed, turn the water on in ditches, and Nature does the rest.

NOORAMA.—Owners, the British Investment Company; manager, C. J. Scott. About 20 miles south of Camden Park. There is a grand bore here, but no cultivation.

GRAZING FARMERS WITH BORES.

HARRIDAN PARK.—Mr. Beal's property. There are two bores on this land, and the owner floods his paddocks and lets the grass grow. Other selectors adjoining his property are Mrs. Manus, of Abadoah; Mr. Webb, of the Nine-mile, and McLaren Bros., of Red Bank, all holding 10,000-acre blocks of splendid land which is improving in value every day. Mr. Phillott's property is about 18 miles from Cunnamulla. There is a good bore on the place, and some cultivation is done. Melons 56 lb. in weight are produced here.

LONGLANDS.—Owner, Mr. O'Connor. This gentleman is the pioneer wheatgrower for grain. His bore runs 5,000,000 gallons per day. The wheat grown here was a grand sample, and was produced from seed sown broadcast and scarified into the ground, which is typical wheat land, and, being level, is well adapted for irrigation.

OFFHAM.—Mrs. Palmer has a beautiful selection here. There is a very good bore, which is utilised to irrigate grass land to such purpose that horses in the horse paddock can be seen up to their knees in rich grass. It was a perfect oasis in the wilderness in December, 1902.

Going north along the river are the following selections:—Tracey's, 8,000 acres; Beardmore's, Nulla; Manus, Spring Grove; G. White, Wallen; J. C. H. Schmidt, Goolburra. South of Cunnamulla are—West Burrenbilla (B. Smith) and Greenbank (H. Albion). There are no bores

on these selections, but the owners would all benefit if the river were dammed. Towards Eulo, there is Mr. W. Carroll's selection, Curragha, with a fine bore. He irrigates for grass, and is very enthusiastic about it. The grass is cut for hay.

KAHMOO.—R. D. Rankin, manager. There is some splendid agricultural country here, watered by a bore close to the Eulo road. There is no cultivation.

MOONJARIE, on Bough Creek, is 25 miles from Cunnamulla. The bore here has a very small flow, but splendid wheaten hay has been grown by its aid. There are several selections close to Eulo, but none have any bores, although one was being put down at Glenara by Mr. Young, the proprietor. Eastward, along the Bollon road, are several homesteads, all in mulga country.

BOWRA.

Opposite Cunnamulla, just on the other side of the splendid waterhole in the river, is the old homestead of Bowra, standing in the midst of about 8,000 acres of rich land. In five or six years this land will revert to the Government. It is splendid agricultural land and close to the town. I have suggested the building of a dam at Kane's Crossing, to back the water up. If that ever comes to pass, this land would be very suitable for close settlement, in areas varying from 160 to 640 acres. These might be occupied profitably by teamsters, shearers, and others, who, not being always at work, would find time to make comfortable homes for themselves and their families by cultivating the ground. There will be plenty of young Southern farmers coming to Queensland when the effects of the drought are no longer apparent, and if South Australians and Victorians understand anything of farming they know a wheat country when they see it, and the West is an ideal wheat country—under irrigation. The rainfall, as we know, cannot be depended upon. Seeing what has been accomplished in the way of cultivation by several grazing farmers and squatters in the West, I am at a loss to understand why others, with equal facilities, view with placid composure the partial or total loss of their stock when the means of saving them are at their hand. The *Voluntas Dei* theory is all very well, but Jupiter recommended the wagoner to put his own shoulder to the wheel before praying for help. *Verb. sap.*

Of what earthly use is it to sink an expensive bore which will yield 4,000,000 gallons of good water every twenty-four hours, and then run it for miles in a trench through country destitute of grass? Stock cannot live on water alone. Yet little or no provision is made for producing grass by a judicious use of the precious water. I saw one bore pouring out millions of gallons into a small dam, whence it ran for miles through the country—grassless country—to expend itself somewhere; and, on the whole line of ditch, the only living things visible were five emus and flocks of galah and other parrots.

[Since the above was written in 1902, on my return from the West, doubtless many changes have occurred in owner and managership of the properties named, but the country is the same, and the suggestions for irrigation hold good to-day.—Ed. "Q.A.J."]

Entomology.

NOTES ON THE BEAN FLY.

(*AGROMYZA PHASEOLI.*)

By E. JARVIS, Assistant Government Entomologist.

Attempts to cultivate French beans in Southern Queensland are apt to prove more or less unsuccessful, and in some districts it is almost impossible to grow this vegetable during the summer months. A crop may look promising at the start, but before long the young plants may show unmistakable signs of arrested growth, and, becoming wilted and sickly looking, droop gradually and at last topple over one after another in a most disheartening fashion.

In the absence of any decided external evidence of injury, the grower is naturally somewhat at a loss to account for the cause of such failure, and is usually too disgusted to closely investigate the matter. In such cases, however, neglect is never advisable; and specimens of the affected plants, with particulars as to the time of sowing and first notice of attack &c., should be sent without delay to the Under Secretary of the Agricultural Department.

The above symptoms are not due to climatic changes, or to the presence of fungi, but to the ravages of a small fly, the grubs of which tunnel in the stems and can easily be found if the skin of a badly-attacked bean-stalk be carefully peeled in places with a sharp pocket knife. Such treatment will disclose a number of tiny pale-yellow maggots, about one-eighth of an inch long, lying close to the surface; and careful scrutiny will reveal the presence of still smaller, reddish, seed-like bodies, immediately under the dried skin, which are the pupæ from which these destructive little insects will ultimately issue.

DESCRIPTION AND LIFE-HISTORY.

The Bean Fly (*Agromyza phaseoli*) was described scientifically by Coquillett in 1899, and may be defined in simple terms, as a very small black insect, no bigger than a pin's head, which, viewed through an ordinary pocket lens, appears tinted with steely-blue or bronze colour, and has dark, reddish-brown eyes, and lovely iridescent wings.

If we visit a bean crop on a summer's day and quietly watch the plants, it will not be long before one of the flies settles on a leaf close at hand to deposit eggs, and we shall then find it an easy matter, with the help of a small magnifying-glass, to watch the interesting operation from start to finish.

Having first raised the hinder portion of its body, the insect bends its abdomen downwards, and, with a special egg-laying instrument, called an ovipositor, punctures the surface, and skilfully inserts an egg in the thickness of the leaf under the skin or epidermis.

If we pick an apparently sound leaf from a badly injured plant, and, holding it against a strong light, look through it, we shall at once notice numbers of watery-looking semi-transparent dots and minute holes distributed over the basal portion, and, upon examination of the former with a pocket lens, discover that a few of these enclose minute elongated eggs.

A young leaf taken from a big Tonga bean on the 3rd of December, 1912, was found by the writer to have received ninety-one punctures, but only nine enclosed eggs, and his observations incline him to suggest that these empty punctures may have been made in positions that would have proved unfavourable to the young larvæ, by preventing, in some way, their easy access to a big vein. He has noticed, too, that when a fly makes a puncture destined to receive an egg, she takes a little longer than ordinary over the operation, and then, moving quickly backwards, remains for nearly half a minute with her mouth to the hole, as though engaged in closing the wound or covering the egg. Such behaviour, however, does not invariably indicate the presence of an egg, as she will occasionally put her mouth to a freshly-made empty puncture, to suck the sap, perhaps, that flows freely from such injuries. Punctures made in leaves of the above-mentioned bean often become noticeable when the damaged tissue has dried and turned brown, and it is not unusual to see hundreds of such dots on the basal portion of a mature leaf. The egg stage occupies from about three to four days, and the tiny grubs, when hatched, commence at once to tunnel towards the leaf stalk, instinctively aware that this communicates directly with the main stem, which in young plants affords the most succulent food.

PTOMAINE POISONING.

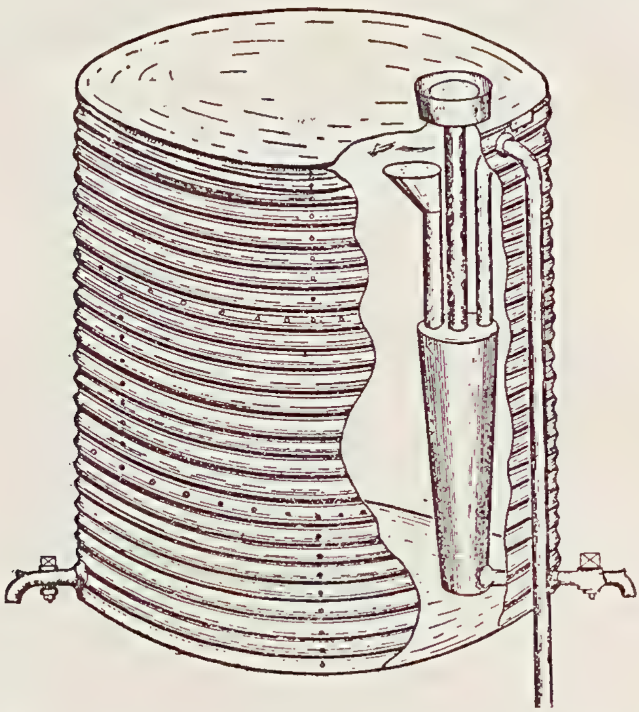
Amongst many other medical tips now being published in "Grenier's Rubber News," for the benefit of those who are far from any medical man, is one for the relief of sufferers from ptomaine poisoning. This form of poisoning is not at all rare in this State, and is generally attributed to eating tinned fish or corned beef which have suffered deterioration in some manner. Large quantities of tinned and salted provisions are used both in town and country, and every now and then serious illness, sometimes resulting in death, has resulted from partaking of such food. If no doctor is available, the following remedies are stated to be effective:—In ptomaine poisoning there is usually vomiting and purging. Encourage both. Give the first emetics handy—mustard and water or salt and water—and persist in the promotion of vomiting until thorough lavage of the stomach is assured. Follow with purgatives, preferably calomel and then salts.

Draughts of water tinged with potassium permanganate could be given or three-drop doses of eucalyptus oil. Apply a mustard plaster to the pit of the stomach and warmth to the extremities. Give stimulants frequently, especially coffee, brandy, and sal volatile. Should there be much collapse and the extremities keep cold, give repeated hot saline enemata—a teaspoonful of salt to a pint of hot water.

General Notes.

A MOSQUITO, FROG, AND DIRT-PROOF TANK.

Whoever has discarded an old galvanised iron tank, and has cut it in two to form the roof of a fowl house, will have seen what a quantity of foul sediment has accumulated in the bottom, showing that all the dust, dirt, and many kinds of filth which accumulate on the roof of a house are washed by the rain into the spouting and thence into the tank, and yet people delude themselves into the belief that they are



drinking " pure" rain water. And even without the washings from the roof, rain water is not pure, passing as it does, in its descent, through strata of smoke, which is merely unconsumed coal, and all the deleterious gases which rise from drains and decaying matter in the streets and gutters, not to speak of its gathering microbes of typhoid, diphtheria, malaria, tuberculosis, &c. It would appear that it is quite possible so to construct a galvanised iron tank that mosquitoes, frogs, insects, and dirt cannot get in to contaminate the water. The means to this desirable

end have been provided by Messrs. Lewis and Newbery's patent strainer, which may be thus described:—

The strainer on top of the tank being above the water level when the tank is full, there is no water for frogs or mosquitoes to deposit their eggs or larvæ; therefore it prevents them from breeding in the tank, as is the case with nearly all existing tanks.

The water enters through the strainer into the dirt receptacle, and any dirt that comes from the roof is collected in this vessel, and on account of its shape being conical it will, by natural laws, have a downward draw, and all the dirt that enters is drawn to the bottom; while the water rises up through the other pipe, thus there is no agitation to disturb the dirt, whilst with a vessel made parallel—that is, the full height of the tank—there is an agitation in the dirt. The pipe mentioned has a fine gauze strainer on the outlet into the tank, which will prevent any light floating particles that may rise to enter the tank; thus it is seen that only clean water can enter the tank. The water enters the tank in a shower from the top of this pipe, and is thoroughly aerated, which is a necessity.

A tap or plug is fitted to the bottom of the dirt receptacle, and the water can be drawn from it for any purpose for which clean water is not necessary, such as watering plants, scrubbing verandas, &c. By this means all the dirt that comes from the roof is expelled, and never accumulates. This receptacle has a syphon fitted to it as well, so that, should anyone neglect to drain the dirty water from the receptacle, it will be automatically expelled every time the tank becomes full to overflowing, and the receptacle is thus perfectly flushed out, and left clean and sweet. A study of the drawing will show at once that no dirt, mosquitoes, frogs, or any other dangerous substance that breeds microbes of typhoid, diphtheria, malaria, and yellow fever, or any other dangerous disease, can ever enter the drinking water, and that any dirt, &c., that collects in the receptacle will not remain there long enough to do any harm, but is expelled either automatically by the syphon or through the tap at the bottom in the manner described. Result: Clean pure water, eradication of mosquitoes, frogs, &c., less fever, and better health.

The patent, we are informed, has been approved by the Health Commissioner. Messrs. Campbell and Sons, Creek street, make and fix the strainer to the tanks.

HERMITAGE STATE FARM.

RAINFALL FOR 1912.

The manager of the State Farm, Hermitage, advises that the total rainfall at the farm for 1912 was 27·31 in. as compared with 23·72 in.

in 1911. The days on which rain fell in the latter year were seventy-four, whilst only sixty-six wet days are recorded for 1912, which gave a greater amount of moisture. The rainfall during each month for 1912 was—January, 1·54; February, 4·93; March, 3·50; April, ·3; May, ·8; June, 5·18; July, 2·03; August, 1·07; September, 1·43; October, 3·22; November, 2·84; December, 1·46.

RECIPES FOR HONEY BEER OR MEAD.

This old-fashioned drink is becoming more popular, probably owing to the fact that it is made to suit the palate of most people who can drink a glass of wine, and do not mind dreaming of honey and the honey bee at the same time. The strength is regulated by the amount of honey per gallon of water used. Three pounds will produce a wine suitable for general use; while 4 lb. will give one that is certainly better and will keep longer.

Take 3 or 4 lb. of honey per gallon, according to the quantity required. Mix it with the water and then boil it, removing the scum until none is left. Now add ½ oz. of hops for each gallon of liquid, and boil for a quarter to half an hour. Drain the liquor while hot into a clean barrel, and when lukewarm stir in half a cupful of yeast. Let it work, but fill up as the froth runs over, and bung down when fermentation has ceased.

Another: Use 3 lb. of honey and 2 lemon peels to each gallon of water, boil for half an hour and skim well; put in lemon peel just before boiling ceases, work with yeast, and then put it into a cask, leaving the bung out till fermentation is over. It is also made without the addition of yeast. After boiling and skimming, add the hops to taste; strain and put into the cask, when cool. Keep it in a cool dry place, and put in the bung in a few days.

The late Mr. Abbott said that honey not properly ripened had a faculty for making itself into mead; and the mead so made, without fuss or admixture of any kind, is of the choicest flavour, uncontaminated by yeast or other aid to fermentation, and if bottled at the right time is a "nectar fit for the gods."

After the honey is strained from the comb, soak the comb in water until all the sweetness is extracted. Then strain the comb and boil the liquid. After this, bottle it when fermented, which will take from two to five days. It will then be ready for use. Water sweetened with honey will do as well.

Answers to Correspondents.

COIR FIBRE.

PAPUAN PROSPECTOR, Cairns—

We are aware that no use has yet been made of the quantities of coconut husks accumulated at the various copra stations in Papua. That this industry has not been attempted by planters or natives would indicate that coconut yarn and fibre cannot at present be produced at a profit even with cheap coloured labour. We published a short article on the subject in the August issue (1912) of the journal, which will give you full information on the subject.

As to prices, fine yarn was sold in November up to £34 10s. per ton, rope up to £18, and Ceylon mattress fibre at £7 to £8.

RUSTY GALVANISED IRON.

J. B. NORTH, Esq., Blytheland—

We are not aware of any method of restoring rusted galvanised iron. There is one way of stopping holes caused by rust in a watering can. Dry the can thoroughly. Dip a piece of linen or cotton rag in copal varnish, and put it over the leaky place inside. When thoroughly hardened, give a coat of paint inside and outside the can. Rusty galvanised iron may be made to last by painting it with a mixture of boiled linseed oil and cement, made to the consistency of cream.

TO CURE SELF-SUCKING COWS.

"Enquirer," Blantyre.

Shape a piece of hardwood 8 in. long and ¾ in. thick by levelling the sides and pointing the ends, cutting a groove ⅜ in. deep. Throw the cow, and, when perfectly motionless, pierce the gristle of the nose with a sharp narrow-bladed knife, and isert the stick. The stick must fit close or it will not stay in; hence the need for making the hole small. Once in, it will not distress the cow. There are many devices having the same object, but this seems to answer the purpose best.

Another plan requires a halter, a surcingle, and a piece of wood about 3 ft. long. Put the cow in the bail. Fasten one end of the piece of wood to it by a piece of chain. Put on the halter and lash the other end of the wood to the surcingle. After adjusting the latter, pass the wood between the cow's front legs; then buckle up the surcingle. The cow can feed and lie down without difficulty. Put this arrangement on when the cow has her first calf. When she is dry, take it off.

The Markets.

PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR JANUARY, 1913.

Article.		JANUARY. Prices.
Bacon, Pineapple	lb.	9d. to 10½d.
Bran	ton	£5 10s.
Butter	cwt.	104s.
Chaff, Mixed	ton	£6 to £7
Chaff, Oaten (Victorian)	,,	£7
Chaff, Lucerne	,,	£4 10s.
Chaff, Oaten (Local)	,,	£5
Chaff, Wheaten	,,	...
Cheese	lb.	6½d. to 6¾d.
Flour	ton	£9
Hay, Oaten (Victorian)	,,	£8
Hay, Lucerne	,,	£4
Honey	lb.	2d. to 2½d.
Maize	bush.	3s. 11d.
Oats	,,	4s.
Pollard	ton	£5 15s.
Potatoes	,,	£7 to £11
Potatoes, Sweet	cwt.	4s. to 5s.
Pumpkins	ton	£3 10s.
Wheat, Milling	bush.	4s. to 4s. 2d.
Onions	ton	£7 to £7 10s.
Hams	lb.	1s. 1d.
Eggs	doz.	10d. to 1s. 1d.
Fowls	pair	4s. 3d. to 5s. 6d.
Geese	,,	8s. 6d.
Ducks, English	,,	3s. to 3s. 6d.
Ducks, Muscovy	,,	6s. 6d. to 7s.
Turkeys (Hens)	,,	10s. to 13s.
Turkeys (Gobblers)	,,	30s. to 36s.

SOUTHERN FRUIT MARKETS.

Apples (Choice), per bushel case	4s. to 10s.
Apples (Cooking), per bushel case	7s. to 8s.
Apricots, per half-bushel case	5s. to 8s.
Bananas (Fiji), G.M., per case	17s. to 18s.
Bananas (Fiji), G.M., per bunch	4s. to 12s.
Bananas (Queensland), per bunch	1s. 6d. to 5s.
Bananas (Queensland), per case	12s. to 13s.
Cherries, per 12-lb. box	3s. 6d. to 7s.
Cocoanuts, per dozen	2s. 6d. to 3s.
Custard Apples, per quarter-case	...
Gooseberries, per quarter-case	...
Grapes (Queensland), per half-case	3s. to 5s.
Lemons (local), per gin case	13s. to 15s.
Lemons (Italian), per half-case	20s.
Nectarines, per half-case	5s. to 8s.
Mandarins (Emperor), per case	7s. to 14s.
Mangoes, per bushel case	4s. to 5s.
Oranges (Navel), per double case	22s. 6d.
Oranges (other), per double case	12s. to 22s.
Papaw Apples, per quarter-case	...

SOUTHERN FRUIT MARKETS—*continued.*

Article.	JANUARY. Prices.
Passion Fruit, per quarter-case	5s. to 6s.
Peaches (local), per half case	8s. to 10s.
Peanuts, per lb.	5d. to 6d.
Pears, Jargonelles, per gin case	4s. to 6s.
Pineapples (Queensland), common, per case	3s. 6d. to 4s.
Pineapples (Queensland), Ripley's, per case	5s. to 5s. 6d.
Pineapples (Queensland), Queen's, per case	4s. to 5s. 6d.
Plums, per half-case	5s. to 6s.
Rockmelons (Queensland), per quarter-case	5s. to 6s.
Tomatoes (Queensland), per quarter-case	2s. 6d. to 4s.
Watermelons (Queensland), per crate	30s.
Cucumbers (Local), per bushel case	2s. 6d. to 3s. 6d.

PRICES OF FRUIT—TURBOT STREET MARKETS.

Article.	JANUARY. Prices.
Apples, American (Eating), per case	16s. to 18s.
Apples (Cooking), per case	7s. to 9s.
Bananas (Cavendish), per dozen	3d. to $3\frac{1}{2}$d.
Bananas (Sugar), per dozen	$1\frac{1}{2}$d. to 3d.
Cherries, per quarter-case	6s. to 8s. 6d.
Grapes, per lb.	$1\frac{1}{2}$d. to $1\frac{3}{4}$d.
Lemons (Local), per case...	8s. to 9s.
Lemons (Italian), per case	14s.
Mandarins, per case	2s. 6d. to 5s.
Mangoes, per case	2s. to 3s.
Oranges (Navel), per case	4s. to 7s.
Oranges (Other), per case	3s. to 7s.
Papaw Apples, per quarter-case	1s. to 1s. 3d.
Passion Fruit, per quarter-case	2s. to 3s.
Peaches, per case...	3s. to 5s.
Pears (Cooking,), per case	2s. 6d.
Pineapples (Ripley), per dozen	4s. to 5s.
Pineapples (Rough), per dozen	1s. 3d. to 2s. 6d.
Pineapples (Smooth), per dozen	1s. 6d. to 3s.
Plums, per quarter-case	2s. 6d. to 4s.
Rockmelons, per doz.	1s. to 4s.
Tomatoes, per quarter-case	1s. to 2s. 6d.
Watermelons, per dozen	1s. to 8s.

TOP PRICES, ENOGGERA YARDS, DECEMBER, 1912.

Animal.	DECEMBER. Prices.
Bullocks	£8 15s. to £10 2s. 6d.
Cows	£6 2s. 6d. to £7 2s. 6d.
Merino Wethers	20s.
Crossbred Wethers...	23s.
Merino Ewes	15s. 3d.
Crossbred Ewes	23s.
Lambs	18s.
Pigs (Porkers)	...

BRISBANE FAT STOCK MARKET.

FENWICK & Co., Salesmen, Brisbane, report, under date 16th January, 1913:—

Three Fat Stock Sales have been held at Newmarket since the recess. The total yardings were 2,800 Cattle, 27,000 Sheep, 1,500 Lambs, and about 450 Calves.

At the first sales the market lacked animation, as the Meatworks were not operating. At the last two sales the additional competition of several Meatworks has resulted in good values ruling for all prime stock.

A draft of 340 good woolly Merino Wethers from Jimbour Station sold from 15s. to 18s. 6d.; while 81 short-woolled cross-bred Wethers from Cecil Plains made from 15s. 6d. to 17s. A draft of 48 Prime Bullocks from Barambah Station made from £8 12s. 6d. to £9 2s. 6d.; and an exceptionally fine draft of Bullocks from Coochin Station sold from £7 15s. to £9 17s. 6d., and the line of 115 head averaging £8 9s. 8d. Bullock beef at the sales on 15th January made up to 22s. 6d. per 100 lb.

Weighty Calves are selling well, but for other qualities the market has been dull.

BRISBANE STOCK AND PRODUCE MARKETS.

HIDE AND SKIN MARKET.

HIDES.—Two sales have been held since the recess. The market at the opening sale was about ¼d. lower on hides averaging under 48 lb. than the closing sales of last year, but hides over that weight are very firm; and the second sale ruled firm at opening sale's rates, stout hides selling exceptionally well. For the two sales 16,531 hides were catalogued, our total being 4,034. Best dry station hides sold from 10d. to 11d. per lb. We quote actual sales of two leading brands of butchers' hides as follows:—

J P B.: 1 av. 67 lb. @ 10½d.; 4 av. 58 lb. @ 10⅜d.; 3 av. 56 lb. @ 10⅛d.; 3 av. 51 lb. @ 9⅞d.; 3 av. 51 lb. @ 9¾d.; 5 av. 49 lb. @ 9¾d.; 4 av. 52 lb. @ 9¾d.; 4 av. 48 lb. @ 9½d.; 7 av. 56 lb. @ 9½d.; 17 av. 50 lb. @ 9⅛d.; 3 av. 46 lb. @ 9d.; 31 av. 40 lb. @ 9d.; 26 av. 34 lb. @ 9d.

B B.: 1 av. 58 lb. @ 10½d.; 4 av. 53 lb. @ 9¾d.; 6 av. 49 lb. @ 9⅝d.; 2 av. 53 lb. @ 9¼d.; 3 av. 41 lb. @ 9d.; 14 av. 45 lb. @ 9d.; 28 av. 39 lb. @ 9d.; 2 av. 33 lb. @ 8¾d.

CALFSKINS.—There is a very keen demand, and all carefully prepared lines are sure of a ready market at high prices. To obtain the best results, calfskins should be sent to market wet salted. Wet salted, clean, sound, calfskins are realising from 12d. to 14d. per lb., which runs out at from 4s. 6d. to 5s. 6d. per skin. Best dry calfskins sold to 17d. per lb. We sold at our first sale 5,123, which is the largest catalogue ever offered in Brisbane. Our total for both sales was 7,464 skins.

Sheepskins.—The accumulations of the holidays has been disposed of at the two sales held. Sound short-woolled skins were in keen demand, but damaged were irregular. Woolly skins realised about late rates. Sound full-woolled merinos' skins sold from 8¾d. to 9¼d.; crossbred full-woolled, 7½d. to 8½d.. We sold 11,438 skins at the two sales.

Marsupial Skins (9th instant).—Large catalogues were offered, but in sympathy with the drop reported from the South values for small wallaby skins showed a very big decline. On small and very small skins values were 4s. to 5s. per dozen lower, but on large skins there was only a small decline. First scrub wallaby skins, over 4 lb. average per dozen, realised 2s. 3d. per lb.; seconds, 1s. 11d. per lb.; under 4 lb., 2s. 6d. per lb. All other wallabies showed a decline on late rates, the fall on small skins being very heavy. The main reason for this big fall is the poor quality of the fur now coming forward. Kangaroos, Wallaroos, and Whiptails were in good demand at late extreme rates. Grey Kangaroos firsts, with the exception of very small and extra large skins, realised 4s. to 4s. 1d. per lb.; extra large skins sold to 96s. per dozen; extra large red Kangaroos to 90s. per dozen, Wallaroos to 56s., and Whiptails to 32s. per dozen. Goatskins were in good demand, but sound skins were not as dear, while seconds advanced 3d. per lb. Large skins sold from 40s. to 48s.; others from 7s. 6d. to 38s. per dozen. We sold 15,293.

Sundries—Hair, Horns, Beeswax, Bones: All lines were in good demand at late rates, with the exception of best tail hair, which ruled lower. Best tail hair realised from 29d. to 31d. per lb.; seconds, 25½ d. to 27¼d.; mane, 13d. to 15d. per lb.; washed cow hair, 14¾d. to 15d. per lb.; clean, 13¾d. to 14¼d.; dirty, 10½d. to 12d.; cow stumps—best, 8½d. to 8¾d.; seconds, 6¼d. to 7½d.; washed, 9¼d. to 9⅞d. per lb. Extra large ox horns, 60s. to 80s. per 100; large, 44s. to 55s.; medium, 30s. to 40s.; small, 12s. to 20s.; cow horns, 10s. to 12s.; tips, 3s. 6d. to 6s.; damaged, 3s. to 50s., according to amount of damage. Best bones in truck loads are worth £3 5s. per ton; in bags, £2 10s. Beeswax, 13½d. to 14½d. per lb., according to quality.

STATION PRODUCE.

The volume of business done in station produce may be gauged by noticing that one firm alone among many others, Messrs. Fenwick and Co., disposed of in Brisbane during 1912:—77,240 hides, 56,664 calfskins, 175,457 sheepskins, and 2,824 tierces of tallow.

The prices for light hides in 1912 were the highest on record, being fully 2½d. per lb. increase on former ruling rates. Hides being of such good value, Messrs. Fenwick and Co. strongly advise careful salting and that all dry hides and skins should be painted with an arsenical preparation, to preserve them from damage by weevils, which materially reduces their value. They also inform us that farmers are not earning the money which they should do owing to their neglect of the pig.

Farm and Garden Notes for March.

FIELD.—Take every opportunity of turning up the ground in readiness for sowing and planting winter crops. The main crop of potatoes should at once be planted. As the growth of weeds will now be slackening off, lucerne may be sown on deeply cultivated soil. The latter should be rich and friable, with a porous subsoil. The land should be thoroughly pulverised. Do not waste time and money in trying to grow lucerne on land with a stiff clay subsoil. Prepare the land a couple of months before sowing, care being taken to cross plough and harrow before the weeds have gone to seed. This ensures a clean field. Sow either broadcast or in drills. In the former case, 20 lb. of seed will be required; in the latter, 10 lb. A good stand of lucerne has been obtained with less quantities. Lucerne seed is worth from £2 16s. to £3 5s. per cwt. Should weeds make their appearance before the plants have sent down their tap roots, mow the field. Before they can again make headway enough to do any damage, the lucerne will be strong enough to hold its own against them. Harrow and roll the land after mowing. Gather all ripe corn. It is now too late to sow maize, even 90 Day, with any certainty of harvesting a crop of grain. Rye grass, prairie grass, oats, barley (in some districts, wheat), sorghum, vetches, carrots, mangolds, and Swede turnips may be sown. In Northern Queensland, sow tobacco seed, cowpea, carob beans, sweet potatoes, opium poppy, &c. Sow anatto, jack fruit, and plant kola-nut cuttings. Some temperate-zone vegetables may be planted, such as egg plant, potatoes, &c. Coffee-planting may be continued. Harvest kafir corn and paddy.

FLOWER GARDEN.—Now is the time to plant out bulbs. A complete garden could be furnished with these charming plants, which are to be had in every colour and variety. Amongst the many are—Amaryllis, anemone, arum, babiana, crinum, crocus, freesia, ranunculus, jonquils, iris, ixias, gladiolus, narcissus, Jacobean lilies, tigridia, tritonia.

All bulbs like well-drained, somewhat sandy soil, with a plentiful admixture of leaf mould. Herbaceous plants and annuals which it is intended to raise from seed should be sown this month. Such are Antirrhinums (snapdragon), asters, cornflowers, dianthus, larkspurs, daisies, cosmea, candytuft, lupins, gaillardias, godetia, mignonette, poppies, pansies, phlox, sweet peas. Cannas now planted will require plenty of food in the shape of liquid manure. Put in cuttings of carnations. Chrysanthemums require attention in the way of disbudding, staking, watering with liquid manure, &c. Growers for exhibition will thin out to a few buds and protect the flowers from rain and sun. Dahlias should be looking well. To secure fine blooms, disbudding should be done.

Now, as to climbers which may now be planted. These are—*Allamanda Schotii* (beautiful yellow), *Antigonon leptopus,* a charming cerise-coloured climber; *Aristolochia elegans,* handsome as an orchid and easily grown; *Aristolochia ornithocephala* (Dutchman's Pipe), very curious, large, always attracts attention; *Asparagus plumosa,* grows in any shady place; *Beaumontia grandiflora,* splendid white flower, grand for a fence, will grow 50 ft. high; Bignonias of several kinds; Bougainvilleas, with their splendid leafy pink and purple flowers, rapidly clothe a fence or unsightly shed with a blaze of blossom; *Quisqualis indica,* a fine creeper, flowers pink, changing to white; Wistaria, purple and white. Most beautiful is the *Bauhinia scandens,* rarely seen about Brisbane. We grew a plant of this climber at Nundah, and it soon closed in the front of the veranda for a distance of over 80 ft. The leaves are very small, and in the flowering season it presents almost a solid mass of beautiful round bunches of blossoms, something like the hawthorn bloom—pink and white. It seeds freely, but the seeds are difficult to germinate, and when they have produced a plant it is still more difficult to rear it. A rooted sucker from the main stem will in all probability grow.

KITCHEN GARDEN.—During this month a very large variety of vegetable seeds may be sown in readiness for planting out where necessary in the autumn, which begins on the 20th of March. All unoccupied land should be roughly dug, and, where required, add well-decomposed manure. Transplant cabbage, cauliflower, celery, &c. Sow French beans, beet, carrot, turnips, radish, cabbage, cauliflower, cress, peas, mustard, &c. Former sowings should be thinned out and kept clear of weeds. Mulch round melon and cucumber beds with a good dressing of long stable manure, as it assists in keeping the fruit clean and free from damp. Cucumbers, melons, French beans, and tomatoes should be looked for every day and gathered, whether required or not, for, if left on the vines to perfect their seeds, the plants will soon cease to be productive, or will form inferior, ill-shaped, and hence unsaleable fruit.

Orchard Notes for March.

THE SOUTHERN COAST DISTRICTS.

The marketing of the main crop of pineapples will continue to occupy the attention of growers; and as it is probable that the plantations have been allowed to get somewhat dirty during the previous month, they should be cleaned up as soon as ever the crop has been got off. The fruit of the new crop of citrus fruit will be showing signs of ripening towards the end of the month; and as the fruit during this period of its

growth is very liable to the attack of insect pests of various kinds, it is important that steps should be taken to prevent loss arising from this cause as far as possible.

Large sucking moths of several kinds attack the fruit as soon as it shows signs of ripening; and as they always select the first fruit that shows signs of colouring, it is a good plan to gather a few forward fruit and to ripen them up quickly by placing them on a barn floor, and covering them up with bags or straw. They will turn colour in a few days, and develop the characteristic scent of the ripening fruit. The fruit so treated should be hung up in conspicuous places in the orchard as trap-fruit, as not only will it attract the moths, but also the fruit flies. The moths will be found clustered round the trap fruits in large numbers, and can then be easily caught and destroyed. Fruit fly will also puncture such fruit; and if the fruit is destroyed before the larvæ reach maturity, a later crop of these insects is prevented from hatching out. Fruit flies may also be caught in large numbers by means of such artificially ripened fruits. The fruits are smeared with tanglefoot, and hung about the orchard. The fly, attracted by the colour, settles on the fruit, and is caught in a similar manner to house flies on specially prepared sticky paper. These simple remedies, if carefully carried out, will result in the destruction of large numbers of sucking moths and fruit flies.

The yellow peach moth that does such damage to peaches in Spring, and that attacks corn, sorghum, cotton bolls, custard apples, and many other plants and fruits, often does a lot of damage to citrus fruits. It acts in a very similar manner to the second and later generations of the Codling moth of pomaceous fruits, in that it lays its eggs where two fruits touch, under the shelter of a leaf on the fruit, at the stem end of the fruit, and, in the case of navel oranges, in the navel itself; in fact, anywhere that there is a likelihood of the egg not being disturbed. The egg hatches out into a small spotted caterpillar, which eats its way into the fruit, causing it to ripen prematurely, and fall off. Where two fruits touch, it often eats into and destroys both, and it frequently leaves one fruit to go and destroy a second. It is a very difficult insect to deal with, owing to the number of fruits and plants on which it lives; but, as far as citrus fruits are concerned, the best remedy is undoubtedly to spray the fruit with a remedy that will destroy the young insect when it starts to eat the skin of the fruit. Bordeaux mixture has been found efficacious, but I am of opinion that spraying with Paris green and lime, Kedzie's mixture, or arsenite of lead, will also have good results. The latter poison is, in my opinion, well worth giving a thorough test, as it sticks to the fruit and leaves for a long time. Bordeaux mixture, either alone or in conjunction with Paris green or Kedzie's mixture, is, however, a good remedy, as not only will it destroy the larvæ or prevent the moth from

attacking the tree, but it is also the best remedy for black brand or melanose, as well as tending to keep all other fungus pests in check. Fight fruit fly systematically—both by means of the sticky fruit already recommended and by gathering all fly-infested fruit, such as guavas, late mangoes, kumquats, &c., as well as any oranges or mandarins that may have been infested, as if kept in check now there will be little loss throughout the season. A little fruit will be marketed towards the end of the month. See that it is gathered and sweated for seven days before marketing, and don't gather it too immature. Beauty of Glen Retreat mandarins are often gathered and marketed as soon as they show signs of colouring. They are then as sour as a lemon, and anyone who is unlucky enough to buy them will steer off mandarins for some time to come. This variety should not be gathered till thoroughly ripe, as when marketed in an immature state it spoils the market, as it puts people off eating citrus fruit.

Clean up the orchard after the summer rains, and have everything ready for the marketing of the crop. See that there is a good supply of clean, dry, case timber on hand, as one of the greatest sources of loss in shipment is packing fruit in green cases.

Strawberry planting can be done throughout the month. Plant such berries as Federation on the lowest ground, and Aurie, Anetta, Trollop's Victoria, Glenfield Beauty on warm, well-drained soils. Prepare the land thoroughly, so that it is in perfect tilth, and in a fit state to retain moisture well; as on this, as much as anything, the success of the crop depends. Where new orchards are to be planted, get the land ready—not the clearing, which should have been done months ago, but the working of the land, as it is advisable to get it thoroughly sweetened before putting the trees in.

THE TROPICAL COAST DISTRICTS.

The Notes for February apply equally to March. See that bananas are netted—keep down weed growth, and market any sound citrus fruits. Clean up the orchards as well as possible, and keep pines clean. Get land ready where new orchards are to be set out, as tree-planting can be done during April and May. Pines and bananas can still be planted, as they will become well established before winter.

THE SOUTHERN AND CENTRAL TABLELANDS.

Finish the gathering of the later varieties of deciduous fruits, as well as grapes. Clean up the orchard, and get ready for winter. Get new land ready for planting; and where there are old, dead, or useless trees to be removed, dig them out, and leave the ground to sweeten, so that when a new tree is planted to replace them the ground will be in good order.

In the drier parts, where citrus trees are grown, keep the land well worked, and water where necessary.

Queensland Agricultural Journal

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Agriculture.

RAILWAYS AND FARMING.

[CONTINUED FROM FEBRUARY ISSUE.]

Whilst, in Queensland, we have not yet reached the time when it would be justifiable to institute instruction trains, and employ competent lecturers to travel through the country giving practical instruction to farmers at wayside stations, yet the railways have proved of the greatest value in the settlement of the land. Before the lines were carried into the agricultural, mining, and pastoral districts, those engaged in these industries were handicapped by long-distance land carriage, by horse and bullock teams and even pack horses, and the rates charged for carriage were practically prohibitive as far as agricultural produce was concerned. Many hundreds of acres of rich sugar lands were untouched, as it would not pay to carry cane by dray or wagon beyond a certain short distance to a mill. Again, continuous wet weather would render the country roads impassable for days, and even weeks at a time, and considerable losses occurred owing to the impossibility of getting crops to market. Droughts also were contributory to losses owing to the want of feed and water on the roads. The pastoralists were under great disabilities in forwarding station produce by road, considering the great distances of cattle and sheep stations from the seaboard. Wool drays used to be weeks and even months on the roads, both when carrying produce to port and supplies on the return journey, and then they could at most carry 4 or 5 tons on each trip.

All this has been changed by the vigorous railway policy which has characterised successive Governments in this State. As population increased, money was lavishly and most judiciously spent in constantly extending the railways in all directions and in all parts of the country, wherever a present or prospective return could be with any certainty relied on. Whilst rainfall in sufficient quantities at regular intervals is a very much-desired commodity to primary producers, the great factor in the prosperity of the latter, and in the welfare of all our industries has been—and continues to be—the railway. From the moment the settler has acquired his land, no matter how far distant inland, the Railway Department has always granted him concessions on freight, on his stock and implements, which in the first instance are carried free to the railway station nearest to his selection, his fencing and building material, at a reduction of 25 per cent. on ordinary freight rates. The opening of new lines enabled the Lands Department to throw open and quickly settle large areas of rich land which, without such cheap and rapid communication, would probably to this day have still been devoted to sheep and cattle runs, carrying a sparse population; whereas to-day, thanks to the railway, they are closely settled by farmers, dairymen, and sugar-planters. It is the same in the case of the mining districts. The weary land journey from Townsville to the Etheridge or to Cloncurry is no longer performed by cumbersome wagons, spending weeks on the road, but by trains taking hours, when the former required an indefinite period to arrive at their destination. Again, travelling mobs of fat and store cattle and sheep from the far West to the coastal districts by road has been abandoned wherever the railway is in existence, thus avoiding losses which in the days of road travelling were unavoidable, such as losses from weakness in dry seasons, losses from the eating of noxious weeds, poison bush, &c., and loss of condition in fat stock, not to speak of the expense of droving, and the length of time on the road. All this, and much more, goes to show the enormous value of the railways to the various industries, rural and urban, of Queensland. In connection with the carrying of the college to the farmers in America, mentioned in the February issue of the journal, the Department of Agriculture and Stock has made a somewhat similar move, with the difference that, instead of employing special instruction trains, a large and varied exhibit of the products of the State has been gathered together with the object of carrying it to country shows in succession during the year. Whenever it is thought advisable to prolong the visit, the exhibit will remain for a day or two after the close of the show to which it may be attached for the time. As occasion requires, the exhibits will be constantly renewed, and added to, to meet the agricultural conditions of different districts, whether cereals, dairy crops, sugar, cotton, fruit, or general tropical products. This unique exhibit has made its first appearance at Warwick, and is in charge of the Instructor in Agriculture, who will give all necessary information either by lectures, personal interviews, or, where possible, by practical demonstrations. Such a departure could not have been undertaken were it not for the facilities afforded by the agricultural railways.

SOIL MANAGEMENT.—II.

BY G. B. BROOKS, Instructor in Agriculture.

In the January issue of this journal, mention was made of the beneficial effect of early preparation of the soil on grain crops. The effect is no less marked in the raising of English potatoes, more especially the spring crop. This crop is planted in a generally dry period of the year, and it is invariably considered that a good deal of risk attends the securing of a payable return.

It has been observed that heavier yields are obtained from crops maturing before the extreme heat of summer, and to secure this end, early planting is resorted to. In some districts, during the recent years, the planting season has been advanced by at least a fortnight. In doing so, the grower risks losing his crop by late frosts, but he knows that if he escapes these, he will be recompensed by a better return, and a chance of an early market and enhanced prices.

Early planting is, no doubt, an important factor, but the real secret of success lies in the conservation of moisture in the soil, for it is upon this factor that early germination depends, since the spring crop moisture can only be conserved by practising early preparation of the soil.

During dry weather, land worked up just previous to planting has lost most of its moisture. The seed lies dormant until rain falls, which may not occur for weeks. In this case, the early period of growth is brought into the hot summer months, when thunderstorms are experienced, with the result that the combined effect of heat and moisture has forced growth to such an extent that the tubers are invariably small, misshapen, and of poor quality, while it not infrequently happens that, although the crop looks promising, not a single tuber has formed.

This happened in connection with the 1911 spring crop, which looked exceptionally healthy towards the latter end of October, and, according to appearance, gave promise of a good return. When it came to harvesting, however, many growers were surprised to find that not a single tuber had formed, and numerous inquiries were made regarding the cause of this failure. Fortunately, there were a few exceptions, some growers securing a heavy yield. When the light of investigation was brought to bear on the matter, what did it reveal? A difference of variety or soil or the use of fertilisers? Neither! The farmer who harvested the heavy crop was the man who had practised early preparation of his land. His soil contained the necessary moisture to ensure speedy germination, so that, by the time thunderstorms came along, the crop had reached a period of growth when rains proved most beneficial.

Lucerne is another important crop that depends, to a large extent, on the proper management of the soil for its success. The preparation in this case is not measured by weeks or months, but extends into years.

Experience has shown that, to secure the best results, it is advisable to crop virgin land of a heavy nature, with either maize, cereal, or potato, for at least two years previous to sowing it down in lucerne.

This practice is, however, not too closely followed, and it will invariably be found that the returns suffer thereby.

Many instances have come under my observation where half the field has been put under lucerne following the first crop taken therefrom, and the remaining half following the second crop. It is invariably found that the first planted area is of a very patchy character, while the later planted portion shows a very even standard, and gives a much heavier yield.

Putting in a lucerne crop closely following a summer, such as panicum, should also be avoided. The panicum crop has used up most of the available plant food, and the period between the removal of the one and the planting of the other, is too short to allow of a further supply becoming available.

I recently supervised an interesting experiment bearing on this point. A field was set apart for the growing of a number of fodder crops suitable for dairying purposes. Two acres were set apart for each variety, which included the following cereals:—Oats, wheat, rye, Cape and Skinless barley, and likewise the following panicums: Common, White, Japanese, and French. The cereals were harvested by the beginning of October, and this portion ploughed. The panicums, being a summer crop, were not removed until January. The whole field was then ploughed twice, disked, and put under lucerne. Although the soil was in splendid tilth, the resulting crop was of a very varied and instructive character. A splendid stand was secured from the area which was under cereals, and where the French millet was grown the crop was also very fair; but on the remaining panicum plots it was so poor as to be regarded as practically a failure; in fact, it was decided to plough this portion out and resow. By the end of the season, however, the crop had filled up surprisingly, and twelve months later the difference was scarcely noticeable.

The instances given in this and the previous article are intended to show that working the soil into a loose and friable condition, just previous to planting, is by no means all that is necessary for the production of a full crop, and undoubtedly proves that early preparation is of the greatest importance.

It must be admitted that the average farmer has not yet recognised the importance of early preparation, and the changes that are brought about in the soil thereby.

The wheat farmers, however, are being educated to the necessity of growing varieties suitable to their respective conditions, but the fact must not be lost sight of that the first essential in crop-raising is a full knowledge of the preparation of the soil for the crop, for without this the time and labour spent upon breeding improved varieties are, to a very large extent, wasted.

Incidentally, the same may be said of the dairy farmer. His knowledge of improving the quality of his herd by selection and the introduction of fresh blood is much in advance of his recognition of the fact that the providing of fodder for the needs of his herd is the first necessity to obtain maximum results.

If we turn to the older agricultural countries, we find that the preparation of the land for a crop is reduced to, practically, an exact system. Each month has its own particular work, and to dealay the work for even a few weeks would invariably mean no crop for the whole year. The very favourable conditions under which the Queensland farmer operates in this respect are no doubt responsible for the want of system in the preparing of his land for a given crop. Not only does the planting period for our principal crops (which, in the older countries, is limited to a few weeks) extend through several months, but there is really no month during which some particular crop cannot be successfully planted.

[TO BE CONTINUED.]

THE HANDLING OF RHODES GRASS PADDOCKS.

By D. MACPHERSON, Manager, Kairi State Farm.

It is now something like eight years* since I first expressed my opinion in print on the now well-known Rhodes grass. This, under the heading of "Grass Experiments on the Biggenden State Farm," was published, not only in the "Queensland Agricultural Journal" for October, 1906, but was reprinted in several of the leading papers throughout the Commonwealth. The grass was then little known so far as Queensland was concerned, and I was able to distribute all the seed I could then produce at the rate of 32s. per lb.

Since that time I have given this grass close attention, not only experimentally at Biggenden, but as it is used on commercially successful dairy farms, and now again in the Atherton district, where, on the 50-acre clearing on the Kairi State Farm, burned off only fourteen months ago, the wealth of succulent Rhodes grass growing is a treat to behold; and this clearing has been carrying through all the dry weather a beast to every two acres, one-third of these horses, and all in top condition, and not even a probability of shortage had the dry weather lasted considerably longer.

So much has, however, been written lately in favour of this grass, that it is useless for me to further sound its praises. Still, some remarks as to the handling this grass may be acceptable, based as they are on observation and experience in such varying climates and soils as are found in the Maryborough, Childers, Gayndah, and Kingaroy districts, to say nothing of the Atherton Tableland, which place seems to be the ideal home of this grass. One has first to realise that Rhodes grass pays for haying, being out and away the best hay grass that thrives in any coastal, or partially coastal district in Queensland, and, weather permitting, sufficient hay can be made to carry over the most prolonged dry weather by the simple expedient of shutting up a sufficient area after the first

* Report on Grasses at Biggenden will be found in the March issue of the journal, 1906. Rhodes Grass in October, 1906.—Ed. Q.A.J.

serviceable rains of spring or summer fall, and a cutting can be obtained from the grass so protected every six or seven weeks during the growing weather.

Unfortunately, growing weather is not always haymaking weather, but Rhodes grass is not very particular as to the time it is cut for hay, so that, unlike crops that demand cutting at a critical stage, Rhodes grass allows some latitude to wait for fine weather to cut. Should one, however, quite miss the hay time, there is still a chance to save a valuable crop of seed; and, should the unfavourable weather still continue and the seed also be lost, the stock may be turned in, and it will be found that the paddock will have improved, rather than suffered, from being allowed to grow rank; and as Rhodes grass is one of the few grasses that cattle and horses eat from the top, there will be a very small percentage of waste from turning stock into an overgrown paddock.

Should one, however, have the good fortune to secure several good stacks of hay, it does not at all follow that these have to be broken into on the first period of shortage. If a paddock can be left in early winter with a good coating of grass on it (in full flower, for preference), this will keep green and fresh in spite of cold or dry weather. A sharp frost will certainly cut the tops, but the underneath part remains green and palatable, and can be cut and fed as required, and this will serve through the greater part of a normal winter. The length of time it will last depends almost entirely upon the size of the paddock closed up, and the number of stock fed, for the frosts will have to be, for Queensland, very severe to make much impression on a heavy crop of Rhodes grass, while should the winter prove dry this grass has great drought-resisting powers, and when these are too greatly taxed it has very considerable self-haying properties.

With all its merits, Rhodes grass has certain weaknesses which must be remembered. Above all things it must not be overstocked. It will, all the year round, and one year with another, if treated properly, carry more stock per acre than any other grass. Overstock, however, and you get holes and bare patches in your paddocks, and not only so, but it seems that this grass likes to have a certain amount of length, either because it wants plenty of leaf to carry out its functions properly, or because the roots like shade. Certain, however, it is that a closely-cropped paddock of Rhodes grass does not make the progress or recovery that one less closely fed will do, and particularly is this the case if closely fed during the growing season. If, therefore, your circumstances require that you must feed close, let it be towards the end of the winter that you do so, and allow, if possible, time to recover in the early spring.

If bared either with the mowing machine or by grazing just before winter sets in, the carrying capacity, if the winter is at all cold, will be almost nil, as each frost will cut off every green leaf that shows through.

Start the winter with paddocks well grassed, and you need fear neither normal, dry, nor cold weather, and for abnormal there should be the hay.

SELECTING SEED CORN.

We have frequently impressed upon corngrowers the great importance of selection in the matter of seed corn, and have given full instructions how to proceed to obtain the best results. As it is well to give other people's opinions as to how to select corn for seed, we take the following from the "Farm Bulletin":—

"The yield of corn in Queensland last season was 4,460,306 bushels. This was taken from 180,862 acres, so that the average yield per acre was 24·66 bushels. An improvement of 1 bushel to the acre all round would have meant a difference in the size of the State's corn cheque of £27,877. If we had had the same yield per acre as Victoria, the increase in our cheque would have been over half a million sterling.

"It's a big sum, and you can have your share of it by selecting your seed and planting only those varieties that you know best suit your district.

"Each spring many farmers discover too late that their seed corn either fails to germinate or produces but a weak growth. Unless sufficient seed corn is selected at the right time in the right way, there will be the same deplorable situation next spring—again when it is too late—as there has been at each previous planting time.

"With very few exceptions the best possible seed may be selected on the farm on which it is to be planted, and by carrying out the following instructions, issued by the Office of Corn Investigations, of the United States Department of Agriculture, each farmer may provide himself with an abundance of seed of the highest productivity, for planting in 1913.

"The process of seed selection is of too great importance to be conducted incidentally while husking. As soon as the crop ripens, go through the field with bags and husk the ears from those stalks which have produced best without having had any special advantages, such as extra space, moisture, or fertility. Late-maturing plants with ears which are heavy because of an excessive amount of sap should be ignored.

"Other things being equal, short thick stalks are preferable. These permit of thicker planting, are not so easily blown down, and are usually more productive than slender ones. The tendency to sucker is hereditary. Other things being equal, seed should be taken from stalks having no suckers.

"The same day that the seed corn is gathered the husked ears should be put in a dry place where there is good circulation of air, and placed in such a manner that the ears do not touch one another. If no previous arrangement for caring for the seed has been made, the ears may be suspended with binder twine, tying them about 2 in. apart. The twine will support fifteen or twenty ears.

"If this method cannot conveniently be followed, tables may be improvised by placing boards across boxes or barrels. These boards should be dry and not too wide, and should be spaced 1 in. or 1½ in. apart. The seed ears can be put on these tables, using care to have them spread out to ensure a good circulation of air among them. It will be

advisable to move the ears a couple of times at intervals of about two days, when first put on the tables. Whichever method is used, the seed should be placed in a shed or building having a good circulation of air, and where it will be protected from rain and excessive cold, as well as from rats and mice.

"Do not store the seed in a cellar. The driest cellars are too damp and do not afford a free circulation of air. Do not store the seed in a room in which there will be vapour to condense on it and prevent its drying, as in a barn over stock, or in an outbuilding used for washing.

"If seed corn is stored properly it should be thoroughly dry in from three weeks, and if kept dry it will be safe from injury except by insects and vermin.

"By the proper selection and care of seed corn the yield may be greatly increased with but a slight additional expense. Increases of 18 bushels per acre, due to properly preserving the seed, have been obtained."

SUBSOILING.

By R. JARROTT, Manager, Gindie State Farm.

I do not think that there is much room for controversy as to the benefit of deep tillage. In some instances, when the surface soil is shallow, and resting on stiff clay, it is not advisable to plough deep. If this were done—especially if some of our modern ploughs were used—a part of the raw clay would be brought to the surface, which would not be advisable if the land were required for immediate cropping. But if land of this description had the bottom of the furrow loosened up for a few inches below the usual depth of ploughing, it would be of much benefit.

Anyone who has done any subsoiling is aware that it is a toilsome business, both for men and horses. After the first round, the furrow is partly filled in with the soil that was disturbed by the subsoiler. This makes it hard for the ploughman, as the mouldboard has not only to turn the next furrow but lift it up, owing to the previous furrow being partly filled up. This throws a good deal of weight on the ploughman's left arm. The furrow horse also has a rather bad time, as he is sinking fetlock-deep in loose soil, and trampling it down, thereby partly nullifying the work done by the subsoiler.

Anyone having a two-furrow plough can do this work with considerably greater ease to men and horses, and also dispense with one man, though the same number of horses will be required.

Two of the advantages in using a two-furrow plough are—that the soil disturbed by the subsoiler is not trampled and the furrow horses have solid footing.

It saves trouble if the lands are marked out with a single-furrow plough, as this leaves an open furrow to start on.

Generally, the top of the standards that carry the mouldboards, on a two-furrow plough, are brought up level with the beam. To convert it into a single-furrow and subsoiler, lengthen the standard on the off side sufficient to allow it to drop the required depth.

PLATE 16.—TWO FURROW PLOUGH.

The character of the land, and the depth that it is required to go, will determine what the extension is to be. I might mention that it will be necessary to replace the usual share with one considerably narrower on the subsoiler. We use an old cast share with the greater part of the wing broken off, and it answers very well.

PLATE 17—TWO FURROW PLOUGH WITH MOULD BOARD REMOVED.

The accompanying prints will show what I have endeavoured to explain. One shows the implement as a two-furrow plough. The lengthened standard with two bolt-holes above the beam will be noticed. The other print shows the mouldboard removed and the standard dropped 3 in. This can be lowered a further 3 in. if required.

TOBACCO AT TEXAS AND INGLEWOOD.

Mr. R. S. Nevill, Tobacco Expert, lately paid a visit to the above tobacco districts, and has reported most favourably on the prospects for a good harvest about the middle of April. In both districts the area under tobacco has greatly increased, there being twice as much under this crop as during 1912. At Texas, there are 461½ acres, and at Inglewood 191 acres, and the crops which were being topped in February were looking remarkably healthy and free from disease. The total area to be harvested would have been over 700 acres, but unfortunately a heavy hailstorm completely destroyed between 70 and 80 acres. Notwithstanding the heavy rains which have lately benefited most parts of the State, and unfortunately have caused much destruction and severe loss to farmers in others, the Texas and Inglewood tobacco fields needed rain badly in January, but with the advent of expected showers in February, the crops would be greatly benefited, and Mr. Nevill looks forward to a record crop. Should it amount to 400 tons, this will represent a yield of over 12 cwt. per acre, which, at 8d. per lb., would give the grower over £45 per acre.

The industry which, at one time, was almost exclusively in the hands of Chinese growers, has of late been taken up by many white planters at Inglewood, several new white growers having entered the field, and they will doubtless find tobacco to be a most remunerative crop. Mr. Nevill anticipates that the total yield of good tobacco this season will amount to from 350 to 400 tons, which, at 8d. per lb., would represent a value of from £25,300 to £29,033, which is the largest yield but one harvested since he undertook to build up the industry in 1898.

There were 665 acres under tobacco in the Texas district in 1900, which produced under 10 cwt. per acre, and sold at an average of 6d. per lb. on the spot. At this figure, the crop was worth about £24 per acre. In 1897, there were 755 acres under tobacco, which returned 5,703 cwt., equal to 7·55 cwt. per acre.

Thus, it will be seen that Mr. Nevill has not only been able to improve the quality and increase the price of the leaf, but also to increase the yield per acre.

RECLAIMING ARID REGIONS.

It seems strange, after so much advocacy of farming by irrigation, especially in agricultural journals and Departmental bulletins in the United States of America, and when such vast sums have been expended in Egypt in conserving water for irrigation purposes, to be suddenly told by Dr. R. T. Galloway, an official of the United States Department of Agriculture, that the reclamation of the arid and semi-arid regions of the United States must ultimately fail, owing to the process of saturation wearing out. Irrigation, he said, would be unsuccessful in any semi-arid district in the world. This has certainly not yet come to pass in the dry Western districts of Queensland, where wheat, maize, cotton, and

many fruits are successfully produced on the so-called desert country of the West by irrigation with bore-water. The bores of the West have proved of inestimable value to cattle and sheep breeders in country where, during prolonged dry weather, the losses in stock were enormous before the subterranean water was brought to the surface. Without this means of irrigation, extensive areas of country which, with it, are carrying thousands of sheep, cattle, and horses, would have to be, and in the pre-artesian well days were, abandoned, or the stock was removed to relief country until the drought broke up. We have no particulars of the grounds on which Dr. Galloway bases his denunciation of attempts to reclaim dry country by irrigation, but doubtless more will be heard about the question in due course. If it be correct, then what will eventually become of arid Egyptian lands which have been rendered marvellously productive by utilising the Nile waters for irrigating the cotton fields, vineyards, and maize fields of that country?

AGRICULTURE ON PRICKLY-PEAR LAND.

It has been said that the prospects for successful agriculture on the pear-infested lands in the Mitchell district are very problematical, and this by residents in the district. This idea has to some extent been disproved by the success which has attended experiments in crop-raising by Mr. George Lansdowne, who, with his two sons, came from Goulburn, New South Wales, to Queensland, and selected three 2,500-acre blocks of partially infested prickly-pear land near Mitchell, entering into occupation on 12th April, 1911. At Goulburn, Mr. Lansdowne and his family were engaged in sheep and cattle raising, in combination with fruitgrowing. Whilst thus engaged, he secured first prize, in competition with other orchardists, for the best orchard in the district.

Notwithstanding the pessimistic reports of local residents and others as to the success of agriculture on his holdings at Mitchell, he selected a patch of sandy loam soil on one of them, and is very well pleased with his initial successes in raising such satisfactory crops, both in field and garden. He states that sweet potatoes, pumpkins, watermelons, beans, tomatoes, and cabbages have given excellent results, and it is now his intention to break up an area of land for wheat this season.

In February last, he brought to the Department of Agriculture and Stock samples of Rhodes grass, lucerne, and maize grown on the place. They are described as follows:—

RHODES GRASS.—The land for this crop was prepared merely by harrowing the ground and broadcasting the seed over the surface, no covering being given. A good shower of rain was experienced, and the seed germinated in about a fortnight. The seed was sown on the 14th January, 1912, since then two cuttings have been obtained, and the sample shown in the photograph represents the third cutting.

LUCERNE.—The lucerne was grown under intense cultural methods in the garden, the land being thoroughly prepared by the means of a

spade. The seed was sown on the 14th January, 1912, the same time as the Rhodes grass. It was drilled 18 in. apart. The sample represents the third cutting.

MAIZE.—Ninety-day type. This was sown on ploughed ground early in September, 1912. It only received one cross-cultivation. Ploughed about the end of July, and allowed to lie during the winter. Scarified once only.

All three samples are quite equal to the same crops grown on the coast, the maize being an especially fine sample of cobs, and the Rhodes grass is equally good.

ANOTHER NEW POTATO.

Since the advent of the Northern Star, Gem of the South, Up-to-Date, Sir John Llewellyn, Evergood, and other new varieties raised from seed by Mr. Findlay, who obtained fabulous prices for them, ranging from £500 to £1,000 per ton (sold by Mr. Titus Kine, a well-known Lincolnshire potato grower in 1903), little has been heard of any new marvel in the potato line. The Northern Star and Sir John Llewellyn were tried in Queensland, 5s. per tuber being paid for imported seed, but they never produced the wonderful crops here which were obtained in the old country. To-day, we learn from the "North British Agriculturist" that a new variety has been raised and placed on the market, named the Arran Chief. That journal says concerning it:—

"During the past few seasons this potato has been tested in different parts of Great Britain, the test in many cases being of a severe nature. It has almost without exception taken the leading place in every trial, and proved itself worthy of the name, 'Chief.' The Arran Chief is quite a distinct variety. The tubers, which cluster closely round the plant, are numerous, of good size, nicely rounded, and have comparatively shallow eyes. Not only so, but they are of the very best quality, and make a splendid table potato. After cooking, they can be kept for a day or two, if necessary, and be reheated without showing any tendency to become black. In that respect they resemble the potatoes raised on the famous Dunbar soils. This is an exceptional cropping variety; and one striking and valuable feature is the small proportion of chats and diseased tubers in the produce. Mr. William Tod, Pardovia, Linlithgow, a well-known and much respected farmer, planted 5 cwt. of the seed of this variety in the spring of this year, and a favoured few saw the crop lifted and weighed a few weeks ago. The exact area planted was 1 rood 13 poles (approximately one-third of an acre), and the crop lifted therefrom was 4 tons 13 cwt. 3 qr., of which 2 cwt. 3 qr.—that is, 3 per cent.—consisted of chats and diseased potatoes. This represents a total yield of over 14½ tons per acre. The potatoes growing on either side were Dalhousie and Pink Blossoms, and, though a splendid crop, were considerably behind Arran Chief in total yield; while the fact that they contained about 2 tons chats and diseased tubers per acre—that is,

17 per cent.—puts them still further behind. Arran Chief is not immune from disease, but very nearly so, being infinitely superior to most varieties in that respect. It would seem that this variety has come to stay, and ere long we may expect it to be one of the most common in cultivation.

PRINCIPAL OF THE QUEENSLAND AGRICULTURAL COLLEGE.

Mr. John Brown, who has been appointed Principal of the College, in succession to the late Mr. John Mahon, arrived in Brisbane last month, and at once took over the charge from Mr. H. C. Quodling, Inspector of Agriculture, who has held the position of Acting Principal since Mr. Mahon's demise. Mr. Brown comes to Queensland with very high credentials, both as a practical and scientific agriculturist. Only 31 years of age, he has gained high honours in the High School at Girvan, Ayrshire. In 1903 he gained the McKecknie Scholarship and matriculated at Glasgow University, where he commenced his studies in arts and sciences. In the following year he won the West of Scotland Agriculture Scholarship, and continued his studies at the University and at the Agricultural College for three years. In 1907 he graduated Bachelor of Science in Agriculture, and was awarded the National Diploma in Agriculture. During the present year (1913), he will be eligible for the degree of Doctor of Science in Glasgow University.

In practical agriculture, Mr. Brown has had large experience. He was brought up on a sheep farm in South Ayrshire, and was for some time the manager of it. He devoted three years to working on a large arable and stock farm in Ayrshire, and became practically acquainted with mixed farming, and with specialised lines, such as potato-growing, raising special seed crops, pedigree breeding and rearing of Clydesdale horses and Border Leicester sheep, and the management of a herd of Ayrshire cattle. From March, 1910, to February, 1912, he was director of agricultural instruction and experiments in South Canterbury, New Zealand, and from February, 1912, to February, 1913, he held a similar position in South Australia. Mr. Brown has also held several other important positions in connection with agriculture, and lectureships on the subject in Scotland. He was for a year and a-half sub-editor of the "Standard Cyclopœdia of Modern Agriculture."

NOTES ON SWEDES.

By H. C. QUODLING, Inspector of Agriculture.

Swedes belong to the Brassica family, order Cruciferæ, of the temperate regions of Europe. Turnips were introduced into Mexico from Spain in the latter half of the sixteenth century. Early in the eighteenth century they were used in England for stock-feeding, and they have been adopted in farm crop rotations ever since. In New Zealand and in the Southern States of the Commonwealth they are largely grown for fattening sheep.

The crop is well adapted for the cooler parts of this State, and is well worthy of attention for market garden purposes. They are excellent food for pigs. The crop should be grown during the winter, and be sown early in March. Loamy and alluvial soils suit the crop best, and, when planted in heavy soils, a fine surface tilth is needed. The best returns are obtained on well-prepared ground, where there is a readily available supply of plant food near the surface. Sandy and sandy loam soils usually require to be dressed with superphosphate, a fertiliser to which the plant is very partial. Land which is in course of preparation should be skim-ploughed and harrowed to a fine tilth just previous to planting. Sandy soils ought to be rolled, but heavier types should not be unduly compacted, unless it is necessary to roll to raise the moisture for the germination of the seed.

In preparing to plant in the field when no drill is procurable, a handy seed-sower may be made from a ½-lb. cocoa tin riveted on to a short handle at an angle to suit easy distribution of the seed. A tight-fitting lid is essential. Punch three holes in the lid from the inside of a size to suit the passage of the seed.

Two to three pounds of seed is sufficient to plant an acre of land when the drills are 2 ft. 6 in. apart.

The rest of the outfit required is a marker constructed of light timber in the form of a large wooden-pronged rake, when man-power is the only force available. If a pair of light horses can be obtained, and the area under cultivation is large enough to admit of their use, a marker can readily be made from half a dozen hardwood runners, placed 2 ft. 6 in. apart, and bolted to two 12 in. by 1½ in. pine boards laid above them. Attach a pole centrally in front of the marker, and provide a set of light two-horse swingle-bars. Set up poles in the field, and run out marks for the seed. This is deposited evenly and regularly by means of the above-mentioned cocoa-tin seed-sower, the distribution being regulated by a rhythmical jerk of the wrist as the sower walks smartly alongside the drill. Covering is effected by means of brush or tine harrows.

HINTS TO NEW SETTLERS—No. 3.

By THE EDITOR.

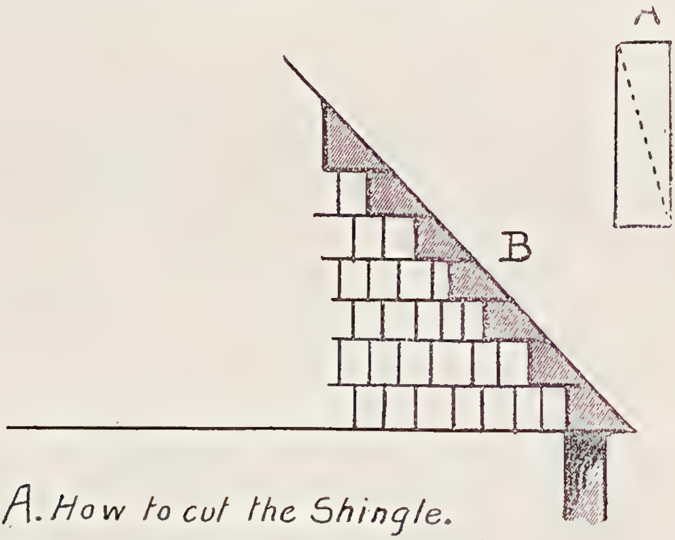
In my last, I explained how to split slabs for the intended house, and it now remains to explain how to utilise them to the best advantage. Most people know how even sawn hardwood will shrink when used, say, for the flooring of a veranda. Your slabs, being split from green trees, will shrink to a much greater extent, being so much thicker than boards, and not being allowed any time for seasoning. The result of this shrinking will be that, when erected, there will, in a very short time, be gaps between each slab of more than an inch. This can be got over in two ways. First, the edges of the slabs must be dressed smooth to remove all splinters, so that they may fit fairly close to each other. But,

even then, as the timber dries, the gaps will soon appear. If the slabs are sunk into the ground a few inches, and nailed to the wall-plate, those gaps cannot be closed, and the only means of keeping out wind and rain is to line the walls with calico. But, if truly dressed, they may be built up horizontally, each end, instead of being rigidly nailed, being slipped into a slot formed by battens on the posts, which, when the slabs are in position, are firmly nailed to the posts. Now, as the slabs dry, they close up on one another by their own weight and scarcely any interval can be seen between them. Should it be preferred to place them upright, a little more trouble must be taken. The object is to enable the slabs to be pushed together as the gaps appear. This is very easily done by sliding them between two battens on the underside of the wall-plate; but, in this case, we cannot sink them into the ground. Therefore, a ground-plate is needed. This may consist of a log placed between the posts on the ground with two battens nailed to its flattened upper surface, as on the wall-plate's under surface. Then the slab is slipped between these battens, and each succeeding slab is pushed close up to its neighbour. When the inevitable shrinking occurs, all that is needed is to drive them up to each other, which is easily done, as there are no nails to prevent their moving. The two ends of the slabs must be smoothly dressed down to about 1 in. in thickness.

As for the framework of the building, this differs little from that for the bark hut, except that the posts should be heavier and sunk deeper in the ground. As this house is to be covered with shingles instead of bark, the rafters must be more carefully selected, and be perfectly straight, so that the battens to carry the shingles may lie level. They should be placed about 2ft. apart, be smoothly dressed to a flat surface, and properly bevelled to fit the ridge-board. Be it remembered that we are dealing with round bush timber, no sawn timber being available, and that the adze is the tool mainly required for the work of dressing the round saplings used in the construction. For shingles, the battens should be about 3 in. apart, and, in the absence of sawn timber, the splitting of these (out of pine timber) should be very carefully done to ensure their being of fairly uniform thickness.

I explained in my last the method of splitting shingles, so it only remains to show how to put them on the roof. Slab and shingle houses are rarely built in the bush with a hip roof, owing to the difficulty of closing the hips to exclude rain, where no galvanised iron is available. Still, this can be done, and in one shingled house I built I had a double hip roof, and it was perfectly rainproof. I will explain by and by how it is done. To receive the nails, hardwood shingles must be bored with a brace-bit, as they are pretty sure to split if this precaution is not taken. Pine shingles need not be bored. When starting to shingle, the first row at the eaves is laid with shingles nearly half as long as those for the upper courses. The second course covers these, and the other courses leave about 6 in. of those below them exposed. Each shingle is so laid as to cover the space between the two below it, thus ensuring a perfectly rain-proof covering. When all the roof is shingled, all that is needed

is a ridge-covering, which may be of bark or zinc, but even this can be dispensed with by nailing on an extra row of shingles projecting over the ridge. Now as to the hip roof. The art of rendering the hips rain-proof consists in what is called "mitring" the shingles closing the hip. This can be better understood from the accompanying diagram. The last shingle of each row is sawn off diagonally so that it not only lies close to its opposite neighbour on the hip but its lower end is exactly in line with all the rest in the same row. If neatly done, no water can possibly get through, even though daylight may be seen when you look up from inside the building. The openings for doors and shutters, or windows, are constructed by simply placing two posts at each opening as far apart as the width of the doors, &c. I should have mentioned that when the rafters have been placed in position they must be braced by



A. How to cut the Shingle.
B. One side of Hip roof.
Mitred Shingles Shaded.

diagonal ties, and two or three light tie-beams must connect the front and back wall-plates, both to secure rigidity of the structure and also to serve as wall-plates for partitions.

The floor may be left in a state of nature, or it may be laid with dressed slabs, or, as is most usual, it may be laid with a cement of white ant hill, or of the ant-bed mixed with cow-dung. When this is well puddled with water, and laid on smoothly to a thickness of 4 to 6 in., it soon hardens and makes a capital floor. The chimney differs in no way from that previously described, except that its walls are enclosed by slabs instead of bark, with the upper part shingled. The lower half of the chimney is usually protected from the fire by a coating of white ant bed or clay.

Owing to exigency of space, I have to defer my intended notes on palings and fence-erecting until next month.

[TO BE CONTINUED.]

MARKET GARDENING.

ON ROTATION OF CROPS.

In the "Horticultural Note Book," by J. C. Newsham, F.R.H.S., the compiler gives the following advice on rotation of crops:—

1. Plants belonging to the same natural order should not be allowed to succeed each other.

2. Some crops are a good preparation for others, as onions after celery.

3. Rotation assists in checking the devastations of insects and fungi to which a crop may be subject.

4. Deep-rooted crops enrich the top soil for the benefit of shallow-rooted varieties which may follow.

5. Different crops require plant-foods in varying proportions; a rotation, therefore, is more economical of manure.

6. A definite system of rotation affords better opportunities for cleaning the ground.

7. Crops which occupy the ground for several years should be succeeded by others of shorter duration.

8. Rotations allow of a better distribution of labour throughout the year.

9. Plants cultivated for their roots or bulbs should not be succeeded by others grown for a like purpose.

10. Rotation may extend from three to eight years, according to (*a*) size of garden, (*b*) quality of the soil, (*c*) products required, (*d*) manures at command, &c.

In the "Text Book on Elementary Agriculture" issued by the Department of Agriculture and Stock, and adopted by the Education Department for use in the State Schools of Queensland, the following notes occur on rotation of crops:—

All books on scientific farming lay great stress on the value of rotation, and with good reason. It does not require a very brilliant intellect to understand that it is most damaging to any soil to continue growing the same crop year after year on it. The particular plant-food required for that crop is gradually used up, and the farmer who puts all his eggs in one basket declares that the soil is worn out. If he would only think a little, and think in time, he would come to the conclusion that whilst one crop requires a great deal of nitrogen, another will restore nitrogen to the soil, and that by alternating even two crops the land will last all the longer.

It is not possible to lay down a law for rotation which is applicable to all soils alike, or even to the whole of one district, but there are some rotations which are generally beneficial in most countries. A very use-

ful rotation is a crop of cowpeas followed by corn, and this again by a root crop. Wheat sown after potatoes or turnips produces heavier crops and a plumper grain than after clover or grass in a moist district. In any case, manuring must not be neglected. Now that artificial manures are so easily obtained, it might be said that rotation is no longer necessary, but this is not actually the case. You may manure and grow grain crops successfully, but by and by a limit is reached, and you will find that it will not pay you to stimulate the crops of wheat to a high productive point, so the next best thing is to grow grain crops in rotation with something else.

There are two general rules to be followed when rotation is practised. One is: Keep crops which require the same ingredients for their growth as far as possible from each other in a rotation. The other is: Do not follow a root crop with another whose habit of growth is the same. As the deep-rooters draw up plant-food from the subsoil in greater quantities than they need for their growth, the succeeding crop should be a surface-rooter—like turnips or onions, for instance.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

MILKING RECORDS OF COWS FOR MONTH OF JANUARY, 1913.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Test.	Commercial Butter.	Remarks.
			Lb.	%	Lb.	
Glen ...	Shorthorn... ...	5 Sept., 1912	860	5·0	48·55	Fed on natural pastures only.
Miss Edition	Jersey	13 Aug. ,,	680	6·1	48·30	
Madame Melba	Holstein	2 Jan., 1913	1,094	3·6	43·76	
Bluebelle ...	Jersey	2 Aug., 1912	669	5·4	42·57	
Lass ...	Ayrshire	30 Nov. ,,	855	4·0	42·33	
Lady Loch...	,, ...	10 July ,,	821	4·5	41·53	
Rosalie ...	,, ...	5 Aug. ,,	830	4·2	39·05	
Miss Lark ...	,, ...	12 Dec. ,,	783	4·3	37·75	
Bella ...	,, ...	4 Dec. ,,	792	4·2	37·26	
Auntie ...	,, ...	4 July ,,	743	4·4	36·64	
Sweet Meadows	Jersey	3 Sept. ,,	413	7·1	34·48	
Silver Nell...	Shorthorn... ...	29 Oct. ,,	688	4·3	33·98	
Burton's Lady	,, ...	1 June ,,	512	5·6	33·71	
Burton's Lily	,, ...	5 Oct. ,,	674	4·4	33·26	
Pauline ...	,, ...	7 Dec. ,,	824	3·6	32·76	
Lonesome ...	Ayrshire	13 Dec. ,,	779	3·6	31·83	
Gem ...	Shorthorn... ...	29 April ,,	555	5·0	31·34	
Flora ...	Jersey	10 Feb. ,,	369	6·5	28·08	
St. Elizabeth	,, ...	21 Aug. ,,	374	5·7	26·06	
Lady May ...	Ayrshire	19 July ,,	513	4·2	24·13	
Honeycombe	Shorthorn... ...	29 Aug. ,,	429	4·8	23·13	

Pastoral.

THE STOMACH WORM IN SHEEP.

(*STRONGYLUS CONTORTUS.*)

By W. G. BROWN, Sheep and Wool Expert.

It has been well said that "Parasites in animals are as weeds on the farm; if few in numbers, they do not seriously interfere with the growth of more desirable things. . . . And drugging animals infected with them is very much like a mere sniping of the enemy, whose main body is not reached."

Since the study of helminthology (literally, the science of worms) has been erected into a special science, a great deal of exact knowledge of parasites has become available to the world; and the sheep farmer, if he will, has now at his command weapons wherewith to fight the particular pests which afflict his flocks.

In Queensland he is fortunate in having only two of the numerous army of species of parasites—maggot-fly and stomach worms; and it will be his own fault if, within a few years, he has not eradicated them.

Mr. Harold Leeney, M.R.C.V.S., London, wrote recently:—"Helminthologists do not come down to the crowd, but lecture to the veterinary students, who have since disseminated much valuable information, but have continued under the disadvantage of not being able to offer 'a cure in a bottle' . . . but the agriculturists do not make sufficient use of the minute knowledge possessed by these young men, who can identify a big or little worm, and know how it is propagated."

In Australia we know that many excellent pamphlets on "The Stomach Worm in Sheep" have been published, yet, from inquiries which are constantly reaching me from different parts of Queensland, I have concluded that they either do not reach the farmer or are not read and understood. Hitherto, our sheep farmers have gone on in the old, old method of using drugs. All of these are merely palliatives, and some are dangerous, their effects often proving to be as evil as the pest itself. We all know, for instance, the evils of frequently continued drenching of sheep with arsenical compounds. Drugs, however, have been the only weapons we have had, for centuries, wherewith to fight parasites, but with the knowledge of the life-history of, say, the stomach worm, which is now available, the veterinarian can offer something which is infinitely better, because it aims at the cause. They are reasoning in this way: "If we are to make any impression on their numbers, we must attack them in the soil, or doctor the land rather than its inhabitants."

It is a fact that animal parasites cannot tolerate lime, sulphur, salt, or soot. The snail, which is the intermediate host of the fluke at one stage of its life, dies in a one per centum solution of salt. The great

families of Strongylus like it no better. Soot is anathema to them, they abominate lime, and sulphur is no better suited to their taste. It is also a fact that, in Britain, sheep running on salty marsh land are attacked by neither fluke nor stomach worms. It is known, too, that 8 cwt. of crushed rocksalt per acre, spread in spring and autumn, besides permanently benefiting the pastures, kills off most of the myriads of parasites and their intermediate hosts.

"Therefore," say the scientists, "let your sheep have access to unlimited salt. If practicable, salt your pastures, and most of the evils of parasitism will disappear. If sulphate of iron, in the proportion of 10 lb. of sulphate to 200 lb. of salt, be added to the lick, the animal will get a tonic which will further minimise the effects of the worms present. Drenching with a good vermifuge once a year, at shearing time for choice, will also help in keeping a large number of parasites from falling on the land, to be reproduced when conditions are favourable."

But when the life-history of the particular parasite to be dealt with is known exactly, the scientist has a far more potent weapon of attack. It consists in starving out the enemy.

Mr. Leeney says: "Starving out the enemy is the true scientific method of warfare against parasites. We have not, as yet, a perfect all-round system, but we are on the road, thanks to such men as our present veterinary chief at the Board of Agriculture. He showed us in South Africa, when adviser to the Cape Government, how to reclaim redwater farms that had been given up by Afrikanders. The disease known as redwater having been proved to be conveyed by infected ticks, he removed the hosts until the ticks died of starvation for want of hosts. This appears to be about fifteen months. A little longer would be better."

The life-history of the stomach worm in sheep—according to Mr. E. A. Weston, G.O.M.C., B.V.Sc., in his report to the Department of Agriculture, West Australia, recently published, is this: "The small worm found in the fourth stomach is the most important, and is known as *Strongylus contortus*. It lives by sucking the blood of its host, and, when engorged with blood, is of a bright red colour, as fine as a hair, and about ¼ in. to ½ in. in length. In a badly-infested animal they may be seen in millions, and the contents of the stomach look like a mass of green water alive with myriads of little red eels. The continual irritation caused by the parasites causes the lining of the stomach to become inflamed, and this further interferes with digestion. The female lays her eggs in the bowel, and these contain living embryos, which undergo further development on reaching water. After several moultings, they are ready to enter sheep again, so that animals drinking water containing them, or feeding over damp places, soon become infested."

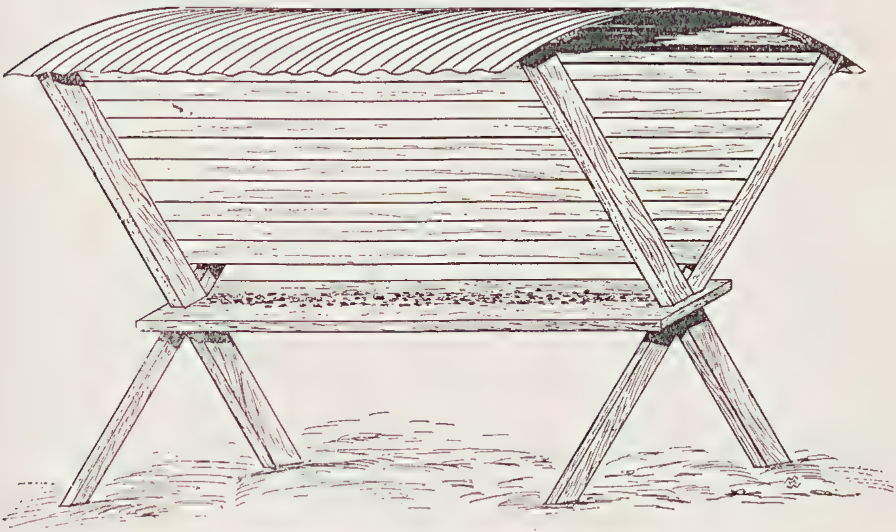
Another authority says that, "At the later stages of its life-history, the Strongylus climbs the stalks of grass and fastens itself to the under side of the leaf. Without moisture it is innocuous, yet retains its vitality for a considerable period of dry weather."

I have not been able to ascertain if the actual period of its life, absent from a host, has been determined; but, by analogy, it seems

certain that there must be such a period, for all the species, whose life-history is known precisely, have such a period. If it be found, the worm should at *once* be starved out, by withdrawing the host.

In the meantime, sheep farmers can rest assured that salt will help them to lessen the ravages of the pest in great measure. The use, too, of troughs for watering their flocks, which is becoming prevalent on the Downs, will also assist in the great work, especially if the natural water be fenced off, and the land suitably drained.

In the administration of salt, the best method I have ever seen was on Ellangowan. It consisted of a V-shaped trough with a lickboard running at the apex of the V at a suitable distance. In practice, the roof was taken off, the salt (coarse Liverpool) placed in the trough, and the lid replaced. The salt by gravitation falls through the slit, 1½ in. wide, running the full length of the lickboard at the apex, and stays until the sheep lick it away. As fast as it is taken from the lickboard, it is replaced automatically from the trough. Herewith is a drawing which speaks for itself.



Salt-lick for Sheep at Ellangowan.

As to the efficacy of salt as a vermifuge there can be no doubt, as shown above. Besides this, it is known that 50 per cent., or one-half, of the solids in a sheep's blood consist of salt; and, as it is estimated that the animal excretes about half an ounce per week in its droppings, it must obtain it from somewhere. Many soils contain only a small proportion of salt; alluvium such as that of the Downs very little indeed, and thus the plants upon which sheep feed contribute very little. One consequence is, that it is common to see sheep licking the earth and rocks in the effort to supply their systems with salt. "The conclusion of the whole matter," then, is: Give sheep as much salt as they will take; and, if 5 per cent. of sulphate of iron be added, there will be a distinct improvement all round in their condition. And drain your land, if you can. By and by the scientists will do better for you.

Poultry.

REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, JANUARY, 1913.

Three thousand four hundred and thirty-three eggs were laid during the month. Several pens have now started to moult. Mr. J. F. Dalrymple, who won our last competition, has been very unfortunate this year in having two non-layers in his pen. It had been noticed all along that his birds laid not more than four eggs on any one day, and, at Mr. Dalrymple's request, we have now identified the useless birds, which are to be killed under the supervision of the Government Veterinary Surgeon. During the past three weeks, since the birds in question have been removed from the pen, the laying has been within a fraction of what it had been all along, so that the four remaining hens must be tip-top layers. Mrs. Craig wins the monthly prize with 144 eggs. Following are the individual records:—

Competitors.	Breed.	Jan.	Total.
R. Burns	Black Orpingtons ...	118	1,301
T. Fanning	White Leghorns ...	129	1,253
A. T. Coomber	Do.	118	1,211
E. A. Smith	Do. (No. 2)	126	1,193
H. Tappenden	Do.	123	1,193
J. R. Wilson	Do.	137	1,192
Range Poultry Farm	Do. (No. 1)	124	1,186
J. Gosley	Do.	87	1,158
A. R. Wooley	Do.	109	1,126
Yangarella Poultry Farm	Do.	99	1,125
Mrs. Sprengel	Do.	128	1,108
Mrs. Beiber	Brown Leghorns ...	114	1,090
R. Burns	Silver-laced Wyandottes	110	1,088
W. D. Bradburne, N.S.W.	White Leghorns ...	118	1,085
B. Holtorf	Do.	117	1,062
Cowan Bros., N.S.W.	Do.	104	1,060
E. A. Smith	Do. (No. 1)	99	1,058
J. Zahl	Do. (No. 1)	126	1,041
A. H. Padman, S.A.	Do.	121	1,029
Range Poultry Farm	Do. (No. 2)	120	1,017
J. Holmes	Do.	121	1,004
H. Hammill, N.S.W.	Do.	117	990
J. Zahl	Do. (No. 2)	109	982
Mrs. Craig	Do.	144	975
F. W. Cornish	Do.	119	959
D. Grant	Do.	101	952
R. Burns	Do.	98	902
W. W. Hay	Black Leghorns ...	78	899
Mrs. Dredge	White Leghorns ...	99	888
J. F. Dalrymple, N.S.W.	Do.	115	881
Totals	...	3,433	32,006

State Farms.

GRAIN AND SILAGE FROM THE SAME MAIZE CROP.

By D. MACPHERSON, Manager State Farm, Kairi.

The following account of an experiment in silage making, carried out on the Kairi State Farm, and which also allowed for the saving of the grain of the maize, may be of interest to those very numerous persons who, while admitting the advantages of silage, do not for one reason or another see their way to build permanent silos.

I am not for one moment going to suggest that this form of silo is better than or even as good as a permanent silo, nor am I going to tell the expert silo stack builder that it is cheaper than his stack; but it has the advantage of requiring neither skill nor capital to build, while the result is a chaffed ensilage.

This stack, or silo, was built as a makeshift, to provide feed for the expected yearly dry spell, and not only did it do so, but now, when the paddocks are covered with the most beautiful young grass, both cattle and horses look for the silage and greedily eat any they get, while the cobs pulled from the stalks before they were chaffed provided me with maize for horse-feed considerably before the maize harvested in the usual way was ready to pull.

The frame of the silo was built with saplings set lightly in the ground so as to form a circle, the two opposite centre ones being the longest and the four opposite outer ones being the shortest. A wire was put round these about 4 ft. from the ground and stapled in place, and when the stack had been built up to that, another wire was put on about the same height further up, and so on to the top, so that the poles were retained in relatively the same position. A thin layer of cornstalks, from which the cobs had been removed, was built against these poles so as to form a ring from 2 ft. to 3 ft. high, and this was filled with chaffed cornstalks from which the cobs had been removed; this was thoroughly tramped down, another ring built and the filling process repeated, and this was continued till the desired amount of corn stover was handled. Two or three loads of full-length stalks should then be put on the top, to prevent the stack splitting, which it may otherwise do when the outer or supporting ring of stalks shrinks; a thin layer of weeds or grass can with advantage be put on top of this, and about 3 in. of earth put over the lot. A cover to turn the rain can be arranged in many ways. I cut the saplings to correct lengths after the stack was finished, laid saplings across from top to top, and fastened galvanised iron to them.

Now, as to the time to cut, so as to save the grain. Let the cobs be well filled and some of the husks turning slightly yellow, but don't wait for the grain to be hard. Cut as soon as you note the general growthy appearance giving place to that of ripening, put on hands

pulling in front of the cutters, and pull all well-filled ears. Should the weather be fine, there is no great hurry about gathering these; in fact, a little weathering is an advantage; but should it be raining or damp, no time should be lost in husking them and putting them in the drying frame. The drying frame may be built out of saplings, or more permanently out of hardwood. Set up two rows of posts standing about 5 ft. out of the ground, 6 ft. from inside to inside of the two lines, and each pair of posts about 10 ft. from the next pair. Tie each pair of posts together by nailing on a sapling or batten about 3 in. from the top, lay saplings or rails on the top of these ties, one close to either line of posts, and another sapling along the ground midway between the two lines of posts. Then lay saplings alternately on either side on end, resting against the bottom sapling, and the other against one of the top saplings. Lay these light saplings alternately along the whole length of the frame, and you will have a V-shaped trough. The ends can be blocked with short sticks of any kind, but this should be done as the frame is filling, so that the cobs not only hold the sticks in place but allow of their being arranged with spaces between. The green husked maize may then be unloaded into this frame, and covered with sheets of galvanised iron just laid on top of the frame crosswise, and weighted. The maize will remain safe in this frame till the general threshing, or will come in for early use before the general crop is on.

SMUT EXPERIMENTS AT THE STATE FARM, BUNGEWORGORAI.

By R. E. SOUTTER, Manager, Bungeworgorai State Farm, Roma.

REINFECTION.

The likelihood of wheat grain, after being treated, producing smutted plants, if exposed to reinfection, is very great, the degree varying according to treatment received. Therefore, all care should be exercised to prevent such happening as far as possible.

The three principal ways by which this undesirable condition is brought about, generally, are through a bunt-ball being broken amongst treated seed, either in the drill or bag, through using a drill which has previously been used for sowing smutted grain, and by putting seed into bags which have held smutted wheat.

Now, all these can be avoided in the following manner:—The bunt balls can be floated off and the seed drill and bags sterilised; the former with steam, nearly boiling water, or a strong solution of formalin; the bags by dipping into boiling or nearly boiling water. There are other avenues for reinfection, and they may be present unknown to the grower, and are of such a nature as not to admit of any further treatment than that meted out to the grain in the first place. Such being so, it must be apparent to all that an ideal smut preventive is, or must be, one which not only kills the spores present when applied but should be so far-reaching in its effects as to be capable of exercising the same influence until the embryo plant has passed the danger zone.

The fact that some of our most successful treatments for killing spores present when applied are of no value in preventing reinfection has been known for some time, as also that those which may do so have a deleterious effect on the subsequent germination, if not neutralised, which action reduces their value in preventing reinfection to a great extent. In order to ascertain the most successful treatment in this direction of those mentioned in last month's report, by which is meant the one giving the least number of smutted plants, tests were made in the following manner:—

INFECTING SEED.—In the first place, as in other experiments, a number of bunt-balls were broken over the grain intended for sowing until they were nearly black with spores.

The seed was then treated with the different preventives.

REINFECTION.—This was accomplished in a manner somewhat similar to when infecting, the difference being that each lot was done separately.

The results show only one negative; and, besides furnishing information in this experiment, they in a great measure further verify those obtained in our preventive experiments. They are as follows:—

Treatment.	Per Cent. Smutted. Reinfected.		Per Cent. Smutted. Ordinary.		Increase. Reinfected.
		1912. Germination.		1912. Germination.	
		Per cent.		Per cent.	
Arsenic	5·7	87	2·7	74	3·0
Carb. Wheat Prot.	16·2	74	1·3	74	14·9
Bluestone and Salt	19 5	77	2·5	78	17·0
Bluestone	25·3	74	4·1	72	21·2
Bluestone and Lime	35·7	87	1·3	76	34·4
Salt	35·7	70	43·4	76	— 10·7
Sheep Dip, $\frac{1}{30}$	46·6	90	44·7	85	1 9
Sheep Dip, $\frac{1}{80}$	60·1	83	48·1	79	12·0

The germination percentages have been included for two reasons: Firstly, to illustrate the increase in the arsenic, bluestone, and lime, due possibly to reduction in covering by extra handling; and, whilst no diminution in efficacy was noticeable in one, it was apparent to the extent of a 34 per cent. reduction in the other. Secondly, it will be noticed that the two formulas containing salt gave a lower percentage.

These experiments will be continued next season; and, should the arsenic still continue to give as excellent results, we shall be in a position to advocate its use, for, in addition to being a fungicide, it might prove, in a measure, a deterrent to the wireworm, and thereby prove an insecticide as well.

JAPANESE MILLET AT WARREN STATE FARM.

This is a most valuable crop, of quick growth, and giving a very heavy yield of succulent fodder, providing the rainfall be sufficient.

The result from this crop at Warren State Farm was as follows:—

A crop of wheat was taken off the area on 2nd November, 1912.

The land was ploughed immediately, and the seed drilled on 20th November in well-prepared soil, at the rate of 10 lb. to the acre. The seed was of good quality, and germination was good. The rainfall during growth was as follows:—November, 32 points; December, 75 points; January, 13.12; making a total of 14.19 in. The crop was an

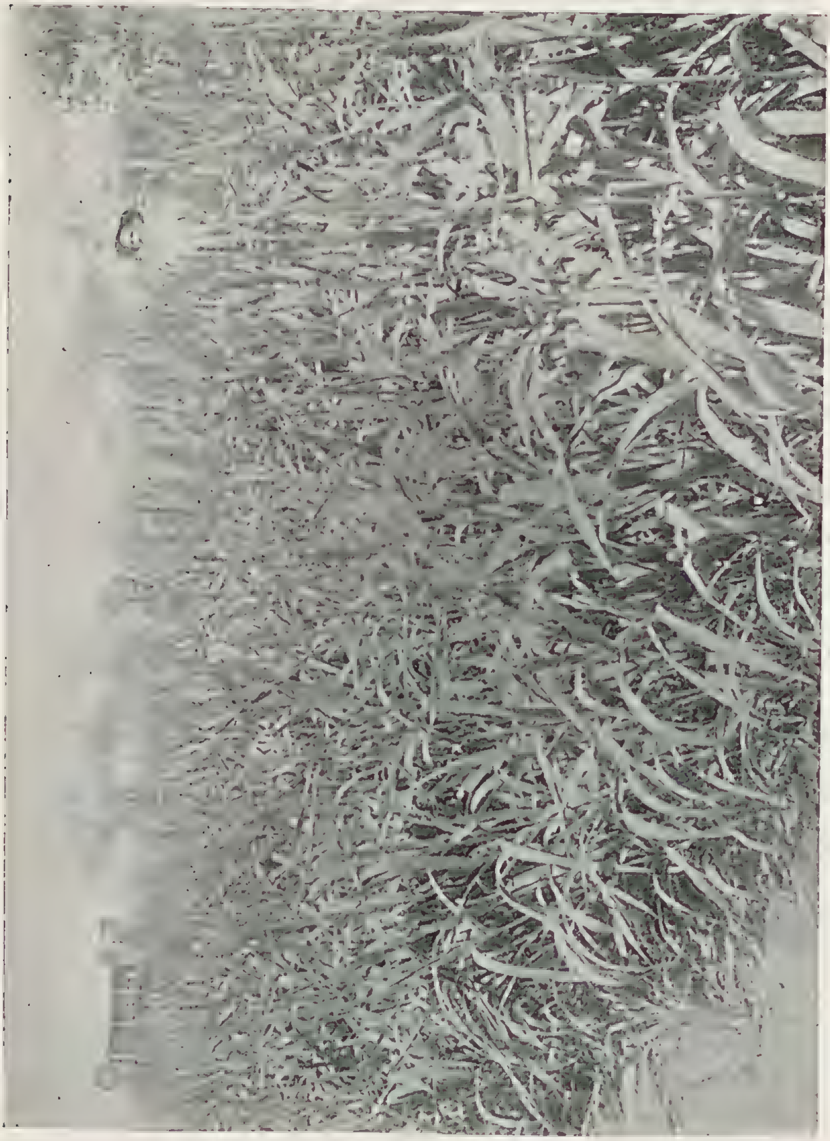


PLATE 18.—JAPANESE MILLET AT WARREN STATE FARM

extremely heavy one, going a little over 9 tons to the acre of green fodder, and very regular. The weather being too uncertain for hay-making, the millet was put into the silo.

The accompanying photo. was taken when the crop had only been planted 9½ weeks.

Horticulture.

PERPETUAL FLOWERING CARNATIONS.

The following British-raised varieties of Carnations were registered by the Perpetual-Flowering Carnation Society in 1912. The descriptions are as supplied us:—

Variegated Gloriosa (sport), flesh-pink, with deeper-coloured flakes. Salmon Enchantress (sport), rich salmon-pink. Mary Allwood (seedling), cardinal pink; a new colour in Carnations. From Messrs. Allwood Bros.

Carmen (seedling), purple. Calypso (seedling), white, pencilled heliotrope. Arcturus (seedling), scarlet. Elegance (sport), white, marked with pink. From Mr. H. Burnett.

Queen Alexandra, a sport from Scarlet Glow, colour, salmon-pink. From Mr. George Clark.

Mrs. A. F. Dutton (sport), varying shades of pink. From Mr. A. F. Dutton.

Albion (seedling), rose-pink. Lucy (seedling), clear light pink. May (seedling), light pink with white stripes. My Rose (seedling), rose-pink. Fanny (seedling), light pink with red stripes. From Mr. C. Engelmann.

Cinderella (seedling), deep mauve, with broad red stripes, evenly distributed over the flower. From Messrs. George Fairbairn and Sons.

Lady Meyer, soft pink. From Mr. E. Guile.

Snowstorm, pure white. Matador, bright cerise. From Mr. Wm. Lawrenson.

Cinnabar (seedling), old rose terracotta. Elsie Boyd, mauve, old rose. Satin Robe (seedling), bright rose-pink. From Messrs. Stuart Low and Co.

The Primate (seedling), salmon-pink. From Mrs. Thomas Page.

Nigella (seedling), pure white. Violet Seely (seedling), bright rose-pink. From Mrs. Seely.

Salmon Winsor (sport), deep salmon rose. From Mr. J. D. Webster.

Lady Algy (sport from Brecon), salmon. Salmon Enchantress (sport), rich salmon pink. From Messrs. W. Wells and Co.

Mrs. Brodie Henderson (seedling), dull red cinnabar colour. Violet Lord (sport from May, 1912).—" Gardeners' Chronicle."

Tropical Industries.

TROPICAL PRODUCTS.

We have been asked why we do not now publish articles of interest to sugar-growers, as in earlier issues of the journal. In Volumes I. to IX., we published 137 articles on all phases of the sugar industry in Queensland, and in Volumes XX. to XXIX. we printed twenty-one articles. The reason for this slacking off is, that when that excellent publication, "The Australian Sugar Journal," was issued, we held the opinion that all interested in the sugar industry in Queensland should obtain information vital to their interests from that publication. Consequently, we ceased to publish anything on sugar beyond occasional interesting notices, and, in future, any articles on the industry appearing in the journal will be those emanating from the officers of the Department of Agriculture, viz.: The Director of Sugar Experiment Stations, the General Manager of Central Mills, the Agricultural Chemist, the Instructor in Tropical Agriculture, and growers and manufacturers of standing in the industry.

Meanwhile, we append the following notes taken from the "Sugar Journal" of 6th February:—

INSPECTION WORK OF SUGAR EXPERIMENT BUREAU.

We are indebted to the Under Secretary for Agriculture and Stock for a copy of the following report by Mr. H. T. Easterby, General Superintendent of Sugar Experiment Stations, on his recent visit to the Northern districts. It is dated 6th January:—

MACKAY DISTRICT.

Since the October rains a very great improvement in the appearance of the cane in this district has taken place, and the depression caused by the fear of another dry season has lifted. Good serviceable rains have fallen nearly every week since October, and the present outlook for a big season in 1913 is bright. The growth of grass since the former visits in September and October was phenomenal. The Experiment Station looked well, and the plant cane has made great progress. The ratoons, owing to the exceedingly dry weather prevailing at the time of ratooning, are somewhat backward.

With reference to the New Guinea canes, these have now all arrived and have been planted out, and are being watched and tended with the greatest care. Unfortunately in a large number of cases the eyes had perished before reaching Mackay. It was noted that the top plants had in each case carried better than the lower plants. According to a recent telegram from the chemist in charge, some sixty-two varieties have germinated up to date.

The Queensland seedlings obtained from the Acclimatisation Society are now being carried into experiment to test their commercial and cropping values. As there are a large number of them now being grown side by side, visiting farmers are able to see their progress and compare the growth of each from month to month. This is exceedingly interesting to them, and has been the subject of favourable comment.

The canes received from Mauritius are now in the ratoon stage, and are looking very well. The appearance of the station is good, and during the past four years considerably more interest has been displayed in the work, not only by the local farmers, but by growers generally in the North. The work of introducing new varieties and their subsequent distribution is highly appreciated.

Cairns District.

Large plantings of cane have taken place in this district, and good crops are anticipated for next season. At Hambledon there will be in addition some 200 acres of stand-over cane. The experimental plot on Mr. Draper's farm has considerably improved since my last visit, and the cane that was planted in the misses was coming through fairly well. The experiment plats, however, are behind, but the varieties sent from Mackay are making excellent growth and command general admiration. The principal canes grown in the Cairns district are still Badila and Goru, the larger percentage being Badila. At Hambledon another New Guinea cane introduced by the Department and sent up by the Mackay Station is being greatly favoured—viz., N.G. 24B. A considerable amount of this cane has been planted out for next year.

The Entomologist and his assistant are hard at work on the grub pest, and are hoping that they will be able to carry out a number of experiments during the beetle season. It is generally thought, however, that the grub pest will not be severe this coming season, which, while fortunate for the growers, may not afford Mr. Girault all the opportunity he desires. He informs me that no remedial measures, beyond those already adopted, are yet in sight.

Mossman District.

A large area of cane has also been planted in this locality, and a 50,000 to 60,000 ton crop is expected for next season. The young plant cane had a healthy and thriving appearance, and the farmers here are taking a keener interest in the important subjects of green manuring and artificial fertilising. The experiment plot on Mr. G. Muntz's farm was visited, and its appearance was highly satisfactory. Mr. Muntz is displaying great enthusiasm in the experiment and has carried out his part of the work in a capable manner. The plot attracts general interest, and is frequently visited by the local farmers. The second plot, at Saltwater, is on the poor side, which is to some extent due to the fact that Mr. Soutter abandoned the experiment for a while, owing to labour difficulties, and then went on with it again. The soil is poor in quality, and a better variety of cane for the experiments should have been chosen.

JOHNSTONE RIVER DISTRICT.

At this place there is promise of an extraordinarily good season. Growing conditions are considered to be the best experienced for many years; even during the past season, which has been comparatively at Innisfail a dry one, the crop totalled 76,000 tons, which is the largest harvested at Goondi for the past six years. The whole of the crop practically consists of the variety Badila.

The experimental plot here is on the farm of Mr. Andrewes, and is making very fine growth indeed. At the present time it has a splendid appearance, and should give good results.

At Mourilyan a poor crop was harvested for the past year, but the prospects for the coming season are bright, and a record crop is hoped for.

HERBERT RIVER DISTRICT.

A good deal of cane has been planted for next season, but up to the time of my visit a very dry spell was being experienced, scarcely any of the rain that had favoured other cane localities had fallen, and in consequence a good deal of the cane was suffering. Only half crops had been harvested for 1912. Should the wet season set in early a good crop should be cut for next year. Badila and B208 are the favoured canes on this river. The experimental plot is on Mr. Ogston's farm, at Ingham, and it is not looking too well. A very poor stand was obtained, and the continued dry weather has not improved matters. The plot planted with varieties from Mackay looks particularly wretched. The cane used for the other plots was N.G. 24A, and Mr. Ogston states that the plants were not too good, and, owing to a deluge of rain (some 13 in.), which fell all at once in June, the ground became very hard and difficult to work.

At a large farm on Macnade, belonging to Mr. Lacaze, the Nunan system of spray irrigation was being installed. The points in its favour were the simplicity of the pipe system and its obviating the levelling and grading of the land and the subsequent furrowing between the rows of cane. On the other hand, when the cane becomes high it appears that the transport of the pipes would be awkward and the spraying of the leaves could not take place unless the spray pipes were made considerably higher. The plant consisted of a 15-h.p. Britannia portable engine, driving a 4-in. centrifugal pump connected with six spear heads. This was throwing some 400 gallons a minute. Sufficient piping, valves, and sprays to irrigate 40 acres had been provided at a cost of £400, the cost of engine, pump, sinking of well, and spear heads being another £400. The main pipe was some 5 in. in diameter, the piping running off through the cane being 3 in., with sprays every 20 ft., the distance between the sprays the other way being 17 ft. 6 in. It was considered that 1 in. of water per hour could be applied. At the trial at which I was present the system was working satisfactorily, and it will be interesting to watch further developments in order to ascertain if this system will prove satisfactory for cane irrigation.

LOWER BURDEKIN DISTRICT.

This locality has also been experiencing a dry time, and many of the farmers had held off from irrigating in the hope of getting rain, thus

throwing their crops back. However, at the time I was there every farmer who had a plant was getting the water on. Unfortunately, there are a large number who have no means of irrigating, and their cane is suffering. Should rain come in time a large crop is expected.

The experimental plot at Ayr is on the farm of Mr. G. McKersie, who has given it every care and attention. The plot looks fairly well, and will improve when rain comes.

GENERAL.

During my visit as many farmers were seen as possible. At each centre, farmers' meetings were held, and questions of preparation, cultivation, manuring, and ratooning were discussed and information and advice given. Good attendances were the rule, and the meetings were greatly appreciated, hearty votes of thanks to the Department of Agriculture being carried at the conclusion of each.

The linking up of one sugar district with another by these visits is undoubtedly beneficial both to growers and to the superintendent. It is found that a much larger interest is being taken in the sugar experimental work of the department as its methods are brought before the farmers and discussed. The work of introducing and testing new varieties of cane were frequently and specially commented on in high terms of praise, and it is now generally conceded that the Bureau is doing useful and valuable work. Generally speaking, an improvement has been made in the culture of cane in the Northern sugar districts during the past few years, which is directly attributable in most cases to the constant advice of the Sugar Bureau in the direction of better methods of cultivation. Green manuring is now being largely practised, and the use of artificial fertilisers and deeper ploughing is coming into favour. A great deal of work, however, still remains to be done; but every farmer who commences and gets good results generally has a number who will follow him.

While in the North, a visit to the Kairi State Farm was made and arrangements concluded with the manager—Mr. Macpherson—to receive some of the older standard varieties and plant same out with the view of ascertaining if their original freedom from disease would not be restored. Mr. Macpherson took great interest in the matter, and will give us every assistance. The farm and stock were looking well, and improvements are rapidly proceeding. Arrangements were also completed with the manager of Kamerunga for the propagation of seedlings. I was unable to visit Proserpine on this occasion, but intend taking it on my next visit to Mackay.

It is proposed to visit all the Southern sugar districts during the next two months, and a commencement will be made with the Woongarra district, Bundaberg.

MOSSMAN CENTRAL MILL.

From the report and balance-sheet of the Mossman Central Mill for the twelve months ended 30th November last, we take the following information:—The profit for the season of 1912 is shown at £9,345 19s. 5d. The total cost per ton of 94 per cent. sugar is given as £10 5s. 9d.

for the past season, as against £10 16s. 1d. for 1911 (the cyclone year); £10 3s. 6d. for 1910; £11 3s. 5¾d. for 1909; and £9 13s. 4½d. for 1908. These figures, however, are irrespective of the amount written off for depreciation, and losses on manures, the Lillie evaporator sold in 1909, and on cattle account in the cyclone year. The price received from the C.S.R. Company (with bonus) was as follows:—1912 (bonus estimated), £12 18s.; for 1911, £13 9s. 6d.; for 1910, £11 8s. 7½d.; for 1909, £12 3s. 5½d.; and for 1908, £11 4s. 5d.—"Sugar Journal."

BANANA CULTIVATION IN NORTH QUEENSLAND.

Banana growing on an extensive scale is shortly to be started by European growers in the Maria Creek district (says the "Mackay Mercury"). Mr. J. McCauley, of Silkwood, Japoon, has introduced 6,000 banana plants from the Buderim Mountain district.

Mr. Howard Newport, in an interview with a representative of the "Cairns Post," said that where the Gros Michel variety was grown, care should be taken in the selection of the locality in order that the fruit be not exposed to fierce winds. Where the white grower was taking it up, it was essential that this fact should be borne in mind. Having reduced the risk, there was undoubtedly a good thing in banana growing for the white man, and he was pleased to see that at least some little effort was again being directed toward the cultivation of the fruit. Especially was this noticeable on Mr. Newport's recent tour around the Clump Point district, where he found quite a number of settlers were turning their attention to banana-growing.

As to the competition of Fiji in the Australian banana trade, Mr. Newport said it was hardly correct to say that North Queensland could not compete with Fiji in the ordinary sense of the term. If you mentioned that matter to anyone in the South who was not conversant, perhaps, with all the facts, he might say that Fiji was underselling Queensland. But Fiji bananas brought 10s. a bunch in the Southern portions of Australia, whilst the Cavendish variety realised from 5s. to 7s. 6d. a bunch, so that where Fiji obtained 10s. Queensland only got the lesser figure. The point in which Fiji held the advantage was in having a specially designed steamer service, also an uninterrupted service. Where North Queensland bananas suffered largely was not in the actual transit on the water, but during the time the vessels were in port. Suppose they were alongside the wharf for, say, thirty-six hours, more damage would be done than in three days on the water. There was no ventilation, or very little, in the ports. Some bananas sent from Cairns recently arrived in the South in a rotten condition. Inquiries were made, and it had been stated that the cause of this was that cargo had been dumped on top of the bananas.

PROFITS OF MAIZE-GROWING.

A correspondent writes to the "Cairns Times" showing that according to the Cairns Harbour Board figures for September, 3,644 tons of maize were exported during the month. At the average price of this at £7 per ton (ruling rate), this means a cash value of over £35,030; and

practically the whole of this cash goes into the hands of the Chinese of the Atherton district. This is not as it should be, adds the correspondent. Surely there is sufficient inducement with an export demand such as shown above to induce white farmers to go in for maize-growing. It is a cash return, and the grower is on a better wicket than even the sugar-cane grower, as he is not dependent on a mill to crush his product and can deal direct with the consumer.

COCONUTS.

It is the popular belief throughout the South Sea Islands that coconuts will not thrive at any great distance from the sea-coast. According to Mr. A. C. Dormer, this is quite an erroneous idea. Mr. Dormer has for the past three years been managing the Tjikoekoen Coconut Plantation in Central Java, about 50 miles from the coast. The coconuts grow as well there, he says, as they do on the coast. "In fact," Mr. Dormer declared, "my experience is that they will grow anywhere as long as the elevation is not too great and the climate is suitable. They ought to do well in the tropical zone of Australia—Northern Queensland, the Northern Territory, and the northern part of Western Australia. From all I hear of the Northern Territory, they would thrive there."* Mr. Dormer said that the Javanese labourers were paid 7d. for a day's work of about eleven hours, and had to keep themselves. He calculated that it took about four Javanese to do the work which one white man would accomplish.

TAMARIND TREES.

As there is a considerable number of tamarind trees growing in this district, mostly neglected (says the "Herbert River Express"), and their fruit looked upon as next to valueless, an expression of opinion by Mr. Howard Newport, Instructor in Tropical Agriculture, will no doubt be read with interest, as the fruit is quite a valuable asset and should no longer be allowed to ripen and drop off the trees to serve no other purpose than so much waste. This fruit, remarked Mr. Newport, is imported in large quantities to Australia from the eastern and western parts of India. The present price is about £56 per ton gross, or about £40 net. Considerable numbers of tamarind trees are grown in North Queensland, of which little use is being made. At the prices quoted, this is a by-product well worth harvesting, as it is cheaply done. The picking operations are simplicity itself, for the ripe fruit will fall after shaking the tree. The curing consists of taking off the outer shell, thus leaving the strings and fruit intact. Bulked in this form it is known commercially as tamarind pulp, worth about 6d. per lb. net. Tamarinds are used in the manufacture of chutney, of which the Australians, as in the case of tea and meat, are the largest consumers in the world. Mr. Newport will be pleased to place any producers in communication with buyers.

* On a recent visit to Papua, we found splendid coconuts in a native garden forty miles from the coast, at an elevation of about 3,000 feet.—Ed. "Q.A.J."

GROS MICHEL BANANAS.

By C. E. WOOD, Manager, Kamerunga State Nursery.

As, from time to time, rumours reach me that there are no suckers of the Gros Michel Banana to be obtained at this Nursery, it may prove of interest to some to know exactly what has been done in connection with the propagation of this variety. Of the seventy-five corms originally received, "all of which were in a more or less decayed condition," I succeeded in raising twenty-four plants, which, I understand, was a very fair proportion when compared with many others who received similar corms.

On 25th January, 1911, ten of the strongest-looking plants were put out in the field, the soil being a very sandy loam, and, judging by previous crops, far from rich, though with treatment it was just the

PLATE 19.—GROS MICHEL BANANAS AT KAMERUNGA STATE NURSERY.

class of soil for the formation of a good root system, on which depends the future development of the plant. It was some time after before the remaining fourteen plants were ready to go out, and in the meantime all had to go through the heaviest and most boisterous wet season ever experienced since the Nursery started. In June, 1911, very little headway had been made so far as growth went; but, the wet season being over, it was possible to start cultivation, and a dressing of artificial manure was also given to enable the plants to get a good start. Since then no manure has been applied, but whenever a new plant was put out a dressing of artificial manure was mixed with the soil in the hole. It will be understood that, no matter how anxious I might be to start taking suckers for increasing my stock and for distribution, it was not possible to take away all suckers that came, as the continual cutting of the roots would have weakened the parent plant, still little more than a

sucker itself. However, where suckers appeared too freely at first, they were cut and kept at ground level. This eventually encouraged suckers further away from the parent plant, and for the time enabled this plant to get all the benefit to be derived from a good root development. Later, some stools were allowed to have two or three shoots in different stages of development, besides young suckers coming, but every now and then these were cut down to ground level, though some were allowed to develop flowers and bunches before being cut down. Others, again, have been allowed to mature their fruit, as many wished to know what the bunch and fruit were like.

One point worth noting is that, so far, the Gros Michel bananas have not been damaged by fruit-fly to anything like the same extent as Cavendish and Sugar varieties. If this always proves to be the case, it will mean a great deal to the grower and to the future development of the banana trade. But, as there are many points in favour of the Gros Michel banana, there is also one drawback, and that is the height of the plant, making it necessary to plant in a position protected as much as possible from wind. But, to return to the suckers: Starting with twenty-four weak plants as mentioned, I have distributed 190 suckers and planted out eighty, making a total of 270 suckers. Of course, there have been more suckers developed; but, as already pointed out, some have to be sacrificed that others may flourish. However, this will show that if a man had started with twenty-five suckers in January, 1911, and had put out every available plant as it came along he would now (in two years) have 2 acres or more of this fine banana, according to the distance he might favour to plant.

Many of these would, of course, have borne fruit during this period, and he would then at this stage be in a position to at least double his area every season. For this tall-growing banana, experience shows that 16 ft. is the minimum distance to plant (18 ft. for preference) so as to get the best plant development, and also enable the plough and scarifier to be used to the best effect.

[The photographs sent are omitted as they were not sufficiently clear for reproduction.—Ed. "Q.A.J."]

THE NEW MANIHOT RUBBERS.

By HOWARD NEWPORT, Instructor in Tropical Agriculture.

Since their discovery—or rather, perhaps, classification and naming —By Dr. Ule, in 1906, the three rubber-bearing trees, *Manihot dichotoma*, *M. piauhyensis*, and *M. heptaphylla*, have been grouped together under the name of the New Manihots, and are nearly always written and spoken of together.

While all are commonly know as Manicoba Rubbers, *M. dichotoma* has also the appellation of Jiquié Manicoba; *M. piauhyensis* as Piauhy or Remanso Manicoba; and *M. heptaphylla* as Sao Fransisco Manicoba.

During 1909 and 1910 seed of these became fairly plentiful and generally obtainable, and since it was said of them that not only would

they grow and thrive in poorer soil and drier localities but come into bearing earlier and bear more than the other and already well-known Manihot (Ceara Rubber—*M. Glaziovii*), as well as most other rubber-producing plants or trees, they were experimented with fairly extensively. Now that sufficient time has elapsed for the anticipated speedy returns to be forthcoming, however, very little is being heard of them, which distinctly supports the rumour that they have not been as successful—or, at least, as rapid in giving returns—as was claimed for them.

Rubber culture in Northern Queensland has not advanced sufficiently for very great interest to be evidenced in new rubber-bearing trees unless, at least, something especially advantageous can be claimed for them in quickness of bearing or facilities of tapping.

These New Manihots have not been entirely neglected, however. Seed of *M. piauhyensis* and *M. dichotoma* were received at the

PLATE 20.—M. DICHOTOMA AND M. PIAUHYENSIS RUBBERS AT THE KAMERUNGA STATE NURSERY, ABOUT THREE YEARS OLD.

Kamerunga State Nursery, Cairns, and germinated fairly well. It was found here, as in most other places, that the larger, bluish, slug-like seed of *M. dichotoma* germinated much quicker and more readily than the smaller, yellowish, and prettily marked seed of *M. piauhyensis*. A considerable number of plants of both were successfully raised and duly planted out at the Nursery. The field plot suffered severely in the cyclone of last year, and the more or less brittle young trees were blown completely over twice. Though immediately attended to and staked, the subsequent weather, consisting as it did of floods followed by a seven-months' drought, did not enable them to recover as rapidly as they might have done. The trees are healthy, but the growth somewhat backward, which may no doubt be accounted for, in a large measure, by the bad times experienced by this experimental plot; but none so far in

North Queensland, even those that have enjoyed uninterrupted growth, have given any indication of that rapid development claimed for them in the accounts received with the seed. Although now of an age at which it was anticipated tapping operations might have been commenced, none of the trees are large enough to experiment with in this direction.

The *M. dichotoma* is very much larger and taller than the Piauhyensis, as may be seen from the illustration. In the plot of these rubbers at Kamerunga the species were mixed. The larger trees and the one indicated by the figure are *M. dichotoma,* while the intermediate and alternate trees, which are also much smaller, are *M. piauhyensis.*

A quantity of seed of *M. dichotoma* was also imported by Director Joseph Campbell, M.A., of the Gossypium Park Estates Company, and successfully germinated in the nursery illustrated. The plants were put out in a forest clearing that had been grubbed, and could therefore be

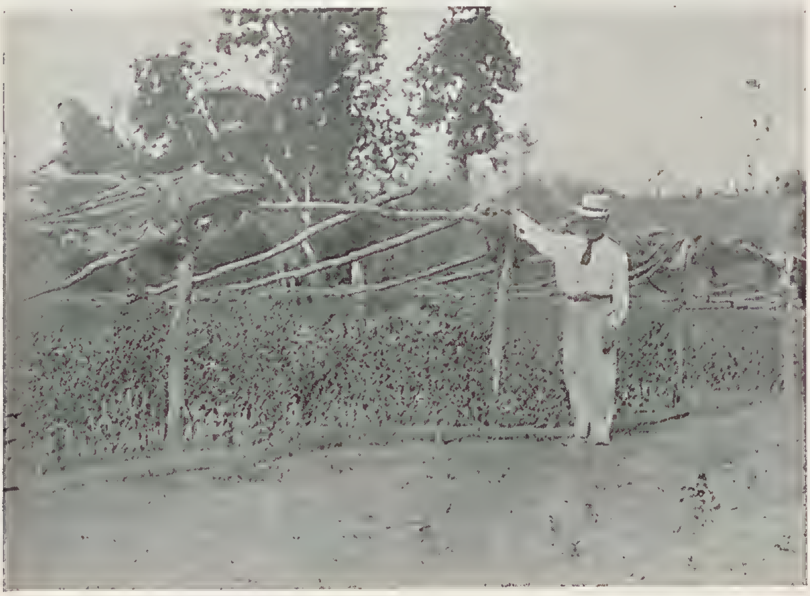


PLATE 21.—DIRECTOR J. CAMPBELL'S NURSERIES OF M. DICHOTOMA

ploughed, scarified, and kept clean by horse-power, and were planted about 10 ft. apart or 500 or so to the acre. In all, 1,500 plants were planted out in October, 1911, and had been, therefore, thirteen months in the field when the photograph was taken in November, 1912. The last illustration shows a well-shaped and nicely-branching specimen of this rubber. Except for a few plants from the Kamerunga State Nursery, all the plants in this field are *M. dichotoma,* raised by this company, and it constitutes the only experiment, of any extent at all, with this new species of rubber in North Queensland. On the whole, the plants in this plot have done very well, and were looking green and healthy with plenty of new wood coming on at the time of the visit, though the effects of the cyclonic winds early in 1912 were very evident in the bent stems and general slope of the trees. The average height was 7 to 8 ft., and girth about 6 in.

In writing on the subject of these three Manihot Rubbers, Dr. E. C. Waterhouse says (in the "Hawaiian Forester and Agriculturalist," of December, 1908) :—

"METHODS OF TAPPING.—In the case of the *Manihot dichotoma* the bark of the trunk is tapped, and an instrument curved at the tip is used. The herring-bone or a single cut is used. Cups are used to receive the latex. The latex coagulates quickly on exposure to air, but apparently not too quickly to prevent its flowing down well into the cup. Water is sometimes used in the cups to prevent too rapid coagulation.

In the case of the *Manihot piauhyensis* and *Manihot heptaphylla*, the shorter trunk and somewhat thinner bark than the *Manihot dichotoma* are not suitable for cutting, and by this method yield little latex. A little earth, however, is scraped away from the base of the tree, the top

PLATE 22.—THE PLANTATION AT GOSSYPIUM PARK.

of the taproot is exposed, and an incision with a round-pointed knife is made at or near the junction of the taproot and the trunk, and the latex flowing into this hole coagulates and is gathered therefrom. Often the collectors coat this little hole with clay to keep the rubber cleaner. Cups have been used, but there is some difficulty in getting them into the hole thus made, and the method is little used at present in collecting from the wild trees, but will doubtless be worked out on plantations.

YIELD OF THE TREES.—This is variously stated to be all the way from 2½ to 11 lb. per year. Though, of course, these statements are made in regard to the gathering of the rubber from wild trees, which are more or less ruthlessly tapped, and especially in the case of the *Manihot dichotoma* the wood is thus often injured severely and the tree dies. Also, it is probably wet rubber that is spoken of, and in some of it, especially the *Manihot heptaphylla* and *piauhyensis*, there may be considerable dirt.

Dr. Ule considers that the *Manihot dichotoma* has the advantage of its caoutchouc bringing a somewhat higher price. On the other hand, the amount produced in the other varieties is considerably greater, according to him. He, therefore, prefers these latter varieties, which he considers will supplant the Ceara for the dry and less fertile areas where Ceara is cultivated. There is no doubt, however, that all of these varieties yield more than the Ceara.

AMOUNT OF LATEX COLLECTED BY ONE MAN IN ONE DAY.—This has been variously stated at from 1 to 8 or 10 lb. Taking into consideration the tendency to exaggeration in regard to any new product, and misleading methods of figuring, still it is generally conceded that considerably more can be collected in a day from these varieties than from the Ceara."

PLATE 23.—A THIRTEEN-MONTH-OLD DICHOTOMA.

According to the "Tropenphlanzer" of 12th February, these rubbers are said to yield more than *M. Glaziovii,* and that to the south of Piauhy, where no wild Manicobas occur, Piauhyensis is planted in preference to Glaziovii. Also that the *M. dichotoma* is tapped by a spiral cut, but the method is deprecated, and it is prophesied that the adoption of other systems will give better results.

It is stated that in the Botanic Gardens at Para, *M. dichotoma* and *Piauhyensis* made poor growth under conditions that admitted of very good growth by *M. Glaziovii.* Dr. Ule claims that the New Manihots are true dry-zone plants, and this fact may also, perhaps, help to account for the comparatively slow development in this part of North Queensland, where an average rainfall of from 75 to 100 in. per annum is experienced.

PLATE 24.—FLINDERSIA MAZLINI, *Bail.*

(A) flower; (a^1) calyx; (a^2) corolla. (B) petal from inside. (C) and (D) stamens. (E) staminodium. (F) pistil; (f^1) disk; (f^2) ovary; (f^3) stigma.

Botany.

CONTRIBUTIONS TO THE FLORA OF QUEENSLAND.

BY F. MANSON BAILEY, C.M.G., F.L.S., COLONIAL BOTANIST.

ORDER MELIACEÆ.

FLINDERSIA, R. BR.

F. Mazlini, *Bail.*, "Q'land. Agri. Jl.," v. (1899), p. 388.—A large tree, stem diameter from 1½ to over 2 ft. Leaves glabrous, of a deep glossy green, usually opposite, but here and there alternate; leaflets 3 to 5, ovate-lanceolate or oblong, with more or less acuminate blunt points, 2½ to 4 in. long, 1½ to nearly 2 in. broad, thin, coriaceous, the lateral primary nerves thin, close, and darkish coloured, petioles 1 to 2 in. long, rhachis about the same length; petiolules 2 to 4 lines, all slender. Panicles wide, with numerous very slender branches, of about the same circumference as the leaves. Flowers numerous, when expanded about 2½ lines broad, calyx hirsute, small; petals pubescent outside in the lower portion, glabrous or nearly so inside. Disk lobed. Fruit oblong, muricate, 2 to 4½ in. long; the protuberances very irregular as to size, glossy, slightly tapering at the base, the valves protruding at the end of the fruit and forming a 5-rayed star. Seeds winged all round, often solitary on one side of the placenta and 2 or 3 on the other, the single one, including wing, 1¾ to 2½ in. long.—J. F. Bail., "Rept., Timber Trees, Herberton District"; "Q'land Agri. Jl.," v. (1899), p. 395. Bail., Q'land Flora, p. 240.

Hab.: Evelyn, *J. F. Bailey* (1899); Atherton, *H. W. Mocatta* (1913).

I have been enabled to complete the description of this valuable timber tree from some specimens lately received from the Director of Forests, Mr. R. W. Jolly, collected at Atherton by the District Forest Inspector.

Plate 25.—Flindersia Mazlini, *Bail.*
(A) Leaf, (B) Fruit, (C) Placenta, (D) Seed.

BOTANIC GARDEN NOTES.

By J. F. BAILEY, Director.

PALMS.

Although Queensland cannot boast of a large number of palms in her flora, the total being something like 30, she has several which thrive well in cultivation. The four mentioned herein may be seen growing in the Brisbane Botanic and other gardens.

The indigenous members of this extensive order of plants, with a few exceptions, do not seem to have been made use of by our aborigines in the same manner as those of other countries. Take, for instance, the following extract from A. R. Wallace's book on "The Palms of the Amazon":—

"Suppose we visit an Indian cottage on the banks of the Rio Negro, a great tributary of the River Amazon, in South America; the main supports of the building are trunks of some forest tree, but the light rafters overhead are formed by the straight cylindrical and uniform stems of the Java palm. The roof is thatched with large triangular leaves neatly arranged in alternate rows and bound to the rafters with forest creepers; the leaves are those of the Carana palm. The door of the house is a framework of hard strips of the stem of Pashiuba palm. In a corner stands a heavy harpoon for catching the cowfish; it is formed of the blackwood of the *Pashiuba barriguda* palm. By its side is a blowpipe 10 or 12 ft. long, and a little quiver full of arrows hung up near it; with these the Indian procures birds for food, or even brings down a wild hog, and it is from the stems and spines of two species of palm that they are made. His great bassoon-like musical instruments are made of palm stems; the cloth in which he wraps his most valued feather ornaments is a fibrous palm spathe, and the rude chest in which he keeps his treasures is woven from palm leaves. His hammock, his bowstring, and his fishing line are from the fibres of leaves of different palm leaves, according to the qualities he requires in them; the hammock from the Miriti, and the others from the Tucan. The comb which is worn on the head is ingeniously constructed of the hard bark of a palm, and he makes fish-hooks of the spines or uses them to puncture on his skin the peculiar markings of his tribe. His children are eating the agreeable red and yellow fruit of the Pupunha or Peach palm, and from that of the Assai he has prepared a favourite drink. That carefully suspended gourd contains oil which has been extracted from the fruit of another palm; and that long elastic plaited cylinder used for squeezing dry the mandiocca pulp to make his bread is made of the bark of one of the singular climbing palms which alone can resist for a considerable time the action of the poisonous juices."

Those to which attention is now drawn are:—

The Common Feather Palm (*Archontophœnix Cunninghami*) so common in our Southern scrubs, and known as Piccabeen, is of graceful habit, and makes an excellent subject for garden ornamentation. This is the palm sold in the shops under the name of *Seaforthia elegans,* a name belonging

to an altogether distinct species found near Cape York. Where space is limited, it would be far preferable to plant this instead of the Cocos plumosa, as it does not grow so high, nor exhaust the soil so much as does the latter species.

While on a visit to Somerset in 1898, the Colonial Botanist collected seeds of the Australian variety (Alberti) of the handsome Malayan palm, *Caryota Rumphiana*. Some of these were sent to these Gardens, and several fine specimens are now to be seen growing on the hill near the bush-house. It possesses a noble foliage, and is of quick growth,

Archontophœnix, *Cunninghamii.*

Caryota Rumphiana, var. *Alberti.*

PLATES 26 AND 27.—PALMS IN BOTANIC GARDENS.

our trees having stems about 10 ft. to the first leaves. Owing to this palm resembling somewhat a huge head of celery, it is known to many by the name of Celery Palm.

The so-called Cabbage Palm (*A. Alexandræ*) of the Northern scrubs is very similar in appearance to the "Piccabeen," but of more robust habit, and easily distinguished from that palm by being whitish on the underside of the leaves. In swampy situations at the edge of the Northern scrubs, it is very abundant. The aboriginal names are

"Borum-bru" and "Ko-pangara," at Cairns and Tully River, respectively.

We have few indigenous fan palms in our flora, the commonest being *Livistona australis,* the well-known Cabbage-tree Palm. It is well adapted for garden decoration, especially when placed in a position shaded from the afternoon sun. Up to within a few years ago the leaves of this palm were largely used in hat-making. A gum exudes from the stem, and, according to Dr. W. E. Roth, this is used as a substitute for lolly by the Morehead River (N.Q.) blacks.

Archontophœnix Alexandræ. Livistona australis.

Plates 28 and 29.—Palms in Botanic Gardens.

ALCOHOL FROM SISAL STUMPS.

In our notice on this subject, taken from the "Rubber Review" of 10th October in the December (1912) issue of the journal, the income from the by-product of alcohol from sisal stumps was given in dollars.

Our attention has been drawn to this by the Director of Agriculture, Mr. F. W. Taylor, Manila. He points out that the word "dollars" has been substituted for "pesos." One peso, Philippine currency, is equivalent to one-half dollar, gold, and Mr. Taylor says that this error in quoting from Mr. Barrett's article would seem to place him in a compromising position as claiming double the yield and profit which are actually obtained from the plantation. Thus, instead of the by-product income being 20,000 dollars, and the leaf alcohol 70,000 dollars, these figures should read 10,000 dollars and 35,000 dollars respectively, or £2,000 and £7,000. We regret the error, which, however, was not our mistake.

Irrigation.

IRRIGATION OF THE WOONGARRA SCRUB, BUNDABERG.

The Woongarra Scrub is a fertile sugar-growing district, covering some 6,000 acres, distant 6 miles from Bundaberg. Fertile as is the land, the fertility could be enormously increased if it could be irrigated, and some years ago (1903) some effort was made in the direction of utilising the waters of the Elliott River. When on a visit to Bundaberg, with a view to gaining information concerning irrigation, I elicited the following and published it in the June, 1903, issue of the journal, under the heading—

THE ELLIOTT RIVER SCHEME.

To form some idea of what is proposed to be done in the way of irrigating the canefields and farms of this fertile tract of country, the reader must imagine a level area of some 6,000 acres extending from within 4 miles of Bundaberg to the ocean, some 6 miles further. The only high hill in the district is called The Hummock, a basaltic hill about 220 ft. in height, which gives its name to the plantation on which it is situated. There is a river in the district named the Elliott, which takes its rise in the country between Bundaberg and Maryborough, and flows into the ocean near the Springfield town reserve. I was driven out to inspect it by Mr. J. White, M.L.A. (now Minister for Agriculture). The portion of country where we struck the river is sandy, scrubby, and intersected by gullies and billabongs, mostly full of clear, fresh, running water. The river itself resembles, in some respects, the upper reaches of the Barron River above the Falls at Kuranda, only here sand takes the place of rock, which forms the bed of the Barron. There are long, deep reaches, 200 ft. wide, the depth varying from 17 to 38 ft., according to accurate soundings which were taken during a period extending over six weeks. Some of the reaches are as wide as stated, others are from 1 to 2 chains in width. Then comes a "narrow," where the clear, cool water rushes past with great velocity, and where the white, sandy bottom can be plainly seen at a depth of from 6 to 8 ft. Below each narrow is another extensive reach. The water flowing in this river is permanent, and some evidence of this is afforded by the quantity and the large size of the fish which inhabit it. It has been estimated that 7,000,000 gallons pass down the stream each twenty-four hours. I am not aware how this flow was estimated; but presume it was based on the principle of measuring the flow by the shallowest spots. Where a river is divided into deep reaches by shallow narrows, the flow of water passing down the stream is gauged by the flow along those narrows. A reach may be 30 ft. deep, but if the outlet be only 4 ft. deep, then only 4 ft. of water are in motion, and the remaining 26 ft. are stationary. But this has, doubtless, been taken into consideration in determining the daily flow of the Elliott River. I merely point this out, as it might be asked how 12,000,000 gallons daily (which is the quantity estimated as needed to irrigate 3,000 acres) can be supplied from a river down which only 7,000,000 gallons a day pass. The stationary water must come into the

bill by the use of the pumps. The highest point of the land to be irrigated lies at an elevation of 117 ft. above the surface of the water—this during the drought. I am informed by an authority on irrigation that when rain fell in March, and the Burnett River ran strongly, there was no response in the latter river.

The scheme favoured by the residents on the Woongarra lands, or, as I understand by a majority of them (for some object to a probable water-rate), is to carry the waters of the Elliott by pipes 32 in. in diameter, for a distance of 6 miles to a reservoir on the top of The Hummock, a height of 218 ft. Thence it is proposed to irrigate, by gravitation, an area of 3,000 acres only, although there are 6,000 acres within the irrigable area. The pumping plant which would be installed would send 12,000,000 gallons daily over 3,000 acres. The financial aspect of the scheme indicates that a sum of £70,000 would be required to carry it out. Supposing this £70,000 to have been obtained, either by loan or by the issue of debentures, then interest and redemption would have to be provided for. This, it is believed, could be done by the imposition of an irrigation water-rate of £3 per acre. The question agitating the minds of some of the Woongarra settlers is: Would the increased crops enable them to pay this rate and yet make a good profit for the farmer? The results would be expected to work out thus:—

On the debtor side the farmer would have to expend—

	£	s.	d.
On cultivating and harvesting, per acre ..	12	0	0
Manuring	5	0	0
Water-rate	3	0	0
	£20	0	0

On the credit side—

	£	s.	d.
60 tons cane per acre, at 12s. per ton ..	36	0	0
Deduct	20	0	0
Net balance to credit, per acre	£16	0	0

If we compare the cost per acre by this scheme with that by the well-system, it will be seen that there is very little difference between them, as, by the latter, a farmer possessed of the necessary capital or credit could lay down a plant sufficient to irrigate 200 acres for £760, as at Waterview; or to irrigate 250 acres, as at the mill well at Qunaba, for £2,057; or, again, to irrigate 300 acres for £832, as at Davidson's well—the cost depending on the nature of the country through which the well is sunk, the height to which the water has to be lifted, the cost of fuel, the lie of the land, and the distance of the pump from the highest point of land to be irrigated. If we take, for example, a shaft well, with pump, boiler, engine, piping, fuel, &c., costing £2,057 to irrigate 250 acres, this works out to £8 4s. 6d. per acre. Add cultivating, harvesting, and manures, it amounts to £25 4s. 6d. per acre. With the less costly plants, the expenses come to £19 15s. 6d., as at Davidson's well. But it should be remembered that once the well is sunk, the engine and boiler, and all other appliances installed, the cost of these is not to be reckoned yearly per acre. In due time they have been paid for, and then only

working expenses have to be reckoned, besides a percentage for wear and tear of machinery.

There being, then, little to choose at the outset, so far as cost per acre is concerned, by both plans, the next thing to be considered is the quality of the water. But here it will be interesting to learn what has been already done in the way of obtaining water in sufficient quantity and of good enough quality for irrigation purposes in the Woongarra. In the following table, I omit the names of the owners of the land on which the wells here described were sunk, distinguishing them only by numbers:—

DATA OF SEVERAL WELLS IN WOONGARRA.

Owner.	Depth.	Quantity of Water.	Quality of Water.	Details of Formation passed through.	Remarks.
	Feet.				
1	18 ...	Insignificant ...	Soakage ...	Red and light-red volcanic soil	Soakage only
2	103 ...	Insignificant ...	Brackish ...	14 feet soil, 89 feet hard basalt, 10 feet rock	Owner now deepening same; cost of sinking, 30s. per foot
3	13·7 shaft $\frac{36}{173}$ bore	Estimated 50,000 gallons per hour	70 grains salt per gallon	130 odd feet rock, bore through 36 feet clay	Cost, 30s. per foot
4	94 shaft $\frac{81}{175}$ bore	Estimated 5,000 gallons per hour	Brackish ...	94 feet mostly rock, 81 feet bore through sandstone, sand, and thin bands of clay	Cost, 30s. per foot
5	101 shaft $\frac{50}{151}$ bore	Estimated 500 gallons per hour	Brackish ...	10 feet soil, 91 feet hard basalt rock-bore	Cost 30s. per foot
6	101 shaft $\frac{59}{160}$ bore	Estimated 1,000 gallons per hour	Good ...	Similar to No. 5	Cost 30s. per foot
7	100 shaft $\frac{30}{130}$ bore	...	110 grains salt per gallon	...	Cost between 25s. and 30s. per foot
8	75 ...	Estimated 5,000 gallons per hour	238 grains salt per gallon	...	Cost between 25s. and 30s. per foot
9	40 shaft $\frac{20}{60}$ bore	Not tested	Good ...	...	Cost between 25s. and 30s. per foot. This well is situated on coastal forest land, about 1½ miles from the beach
10	75 ...	Nil	...	5 feet soil, 70 feet rock, then sand	Cost about 32s. 6d. per foot
11	90 ...	300 gallons per day	Bad	20 feet soil, 50 feet rock, 20 feet sand	Cost, 35s. per foot
12	122 ...	4,500 gallons per hour	Good ...	20 feet soil, 48 feet rock, 34 feet yellow clay, 12 feet sand, 2½ feet rock, 4 feet clay, 4 feet rock, 25½ feet clay	...
13	80 ...	350 gallons per day	Very bad ...	60 feet soil and sand, 20 feet rock	Cost 25s. per foot
14	95 ...	400 gallons per day	Very bad ...	45 feet soil and sand, 50 feet rock	Cost 25s. per foot
15	75 ...	400 gallons per day	Fair	5 feet soil, 70 feet hard rock	Cost 35s. per foot
16	122 ...	...	Useless ...	20 feet soil, 72 feet rock, 30 feet bore through clay	Cost 25s. per foot
17	80 ...	600 gallons per day	Bad	20 feet soil, 60 feet rock ...	Cost not known; estimated at 30s. per foot
18	150 ...	Nil	...	20 feet soil, 60 feet rock, 70 feet clay and sand	Cost not known; estimated at 35s. per foot
19	125 ...	250 gallons per day	Bad	18 feet soil, 107 feet rock (still in rock)	Cost 37s. 6d. per foot
20	97 ...	100 gallons per day	Good ...	12 feet soil, 85 feet rock (still in rock)	Cost, 40s. per foot
21	92 ...	Dry	...	12 feet soil, 80 feet rock (still in rock)	Cost, 35s. per foot
22	124 shaft $\frac{70}{194}$ bore	1,000 gallons per hour	Bad	14 feet soil, 110 feet rock ...	Cost, 40s. per foot
23	122 ...	500 gallons per hour	Bad	14 feet soil, 108 feet rock ...	Cost, 50s. per foot
24	87 ...	200 gallons per day	Fair	16 feet soil, 71 feet rock ...	Cost, 35s. per foot
25	93 ...	500 gallons per day	Good... ...	13 feet soil, 60 feet rock, boulders, and solid rock	Cost, about 25s. per foot
26	64 ...	300 gallons per day	Good ...	7 feet soil, 28 feet rotten rock, 29 feet solid rock	Cost, about 32s. 6d. per foot
27	97 ...	150 gallons per day	Bad	8 feet soil, 89 feet solid rock	Cost, about 25s. per foot
28	116 ...	1,500 gallons per hour	Good ...	12 feet soil, 74 feet solid rock, 30 feet bore	Cost, 40s. per foot
29	88 ...	200 gallons per day	Bad	18 feet soil, 70 feet solid rock (still in rock)	Cost, 37s. 6d. per foot
30	124 ...	300 gallons per day	Bad	18 feet soil, 106 feet solid rock	Cost, 42s. per foot

The above table will serve to show what energy, pluck, and perseverance have been and are being displayed by the Woongarra farmers in their search for the precious water so indispensable to their welfare and, indeed, to their very existence on the land. Here we have an expenditure, up to the beginning of May, of £5,163, on what is practically prospecting. That good water and in fair quantity exists underground is shown by the yields of wells Nos. 12 and 28. The cost of No. 12 is not given, but presumably it would not be less than from 30s. to 35s. per foot, whilst No. 28 cost 40s. per foot. Presuming that these thirty wells had struck good water, and that each well were made to irrigate 50 acres, this would amount to one-half the area which it is intended to irrigate from the Elliott River. Dividing the cost of prospecting already done, as above given, amongst thirty farmers, it will be seen that the cost has, on an average, amounted to £3 8s. 10d. per acre merely to find the water. Having found it in sufficient quantity and of good quality, the cost of engine and boiler, pump, piping, fluming, &c., would have to be added to the expense already incurred. Now, should it come about that the Elliott River scheme fructified, then a water-rate of £3 per acre would be most moderate, as the farmers would not then be obliged to set up, each a separate plant, costing between £300 and £500. On the other hand, seeing that good water has been found below the surface in several parts of the Woongarra, it follows that there must be a continuous supply of subterranean water in the district, unless the wells have been sunk on extinct craters filled with water, and having no connection with each other. This is a question on which the advice and assistance of Dr. Maxwell would be of the utmost assistance to the farmers. I may here state that, at the Sandhills, 12 miles from Bundaberg, there is a shallow well in the sand on the sea-beach, not far above high-water mark, from which a continuous supply of excellent drinking water has been obtained throughout the drought, not only for domestic use but also for that of all the stock in the Woongarra district. It would be interesting to follow up the course of this water inland by a series of trial bores. This might lead to important discoveries in the Woongarra.

To understand the difficulties which have to be encountered in the matter of reaching the underground water in this particular district, it should be noted that the Burnett Delta was originally on the same level as Fairymead; but, in pre-historic times, the overflow of lava from The Hummock covered up the level land, and consequently 100 ft. or more have to be passed through before reaching the sweet water at the same level as at Fairymead.

The Woongarra is the first district to be constituted an irrigation area. At a meeting held in May, 1903, of farmers interested in the Woongarra irrigation, Mr. John White, M.L.A., in the chair, the remarks of that gentleman were thus reported in the "Bundaberg Mail"—

"By an Order in Council the farmers there have the sole control of that fine river, the Elliott, from its source to the limit of tidal influence. He congratulated them on these facts. There was no doubt as to the valuation of irrigation. They had been told by Dr. Maxwell that they

had the best sugar lands in the State of Queensland, and they now had control, he believed, of one of the best water supplies also, and he sincerely trusted they would make use of it at an early date. For himself, he could assure them that he would not spend a solitary penny in testing the quantity of the water available at the Elliott; he was satisfied there was enough and to spare for all their requirements. They might possibly not be able to deluge their land with water, but that there would be sufficient to enable them to get a most gratifying return for their outlay he felt absolutely confident. The cost of the installation would be about £70,000. The committee had all the necessary information to place before an expert if such were necessary. The chairman also said the question which would have to be decided at an early date was the best means of raising the money necessary to carry out the scheme. Personally, he saw no reason why the shire council interested, and even the municipal council, should not guarantee the interest on an issue of debentures. Anyhow, it was a subject they would have to give immediate attention to. Of course, a private company could be formed, but they must remember that in that case they would have to hand over to that company the magnificent stretch of water in the Elliott—a most valuable asset—and he sincerely hoped they would never do anything of the kind, but rather that they would always control it, and, better still, use it.''

What I have here written concerning irrigation in the Bundaberg district obviously does not include a description of every portion thereof. It would demand a lengthened stay in the district to enable me to furnish reliable data on all the irrigated and irrigable areas on the Delta of the Burnett and on other rivers of that portion of Queensland. There would even then remain the danger of the visitor, unless he were a scientific man whose sole business in life is to study the many problems presented by the large subject of water-finding and water conserving, its analysis, its distribution, and the thousand and one matters connected with the most vital of all questions to the rural community and through them to the interests of commerce—even then, I say, there would remain the danger of his being led astray in various ways, not the least factor of which would possibly be the great hospitality and assistance he invariably meets with at the hands of all with whom he comes in contact. It will then be readily understood that I present these notes on the Bundaberg district, and, indeed, all that I have written on other districts of the State on the same subject, from Cairns to Brisbane, with the utmost diffidence, but with the consciousness that nothing has been written in any spirit of partisanship nor with a view to advocating any one irrigation scheme above another. The great fact it has been my aim to publish far and wide is that Queensland possesses tens of thousands of acres of the most fertile land in the world, and that underlying those fertile lands there are vast stores of water sufficient to fertilise the lands of millions of people. Further than this, this State, extending as she does from the tropical to the temperate zone, presents facilities for the production of every vegetable product under the sun. All that is required in some of our fertile districts is an adequate water supply.

That we possess almost everywhere. In the far North it is supplied by splendid rivers and streams which "go on for ever," irrespective of droughts. In the Central, Western, and Southern districts there are, in some localities, large supplies of artesian as well as of subterranean and surface water, together with a fair rainfall; but beneath our feet, at shallow depths on the coast, at lower depths inland, there is, as I have stated, sufficient water to make Queensland the most wealthy of the States of the Commonwealth, even if the cloud-water came only once in three months.

In the issue of this journal for June, 1903, will be found a plan showing the course of the Elliott River, and another of that portion of the Woongarra proposed to be irrigated.

Statistics.

RAINFALL OF QUEENSLAND.

TABLE SHOWING THE TOTAL RAINFALL FOR EACH MONTH OF THE YEAR IN THE AGRICULTURAL DISTRICTS OF QUEENSLAND.

STATIONS.	1912.												1913.
	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.
North.													
Atherton	...	...	...	...	...	...	...	...	...	...	1·11	1·72	37·99
Ayr	...	...	3·53	1·16	1·01	6·70	...	...	Nil	·46	1·51	0·14	8·80
Bowen	1·56	3·15	1·86	0·59	1·76	3·78	...	0·18	Nil	2·46	1·00	0·86	6·99
Cairns	4·81	16·68	5·95	4·71	5·97	8·00	...	2·89	0·75	2 25	1·54	1·71	32·03
Geraldton (Innisfail)*	5·50	18·24	6·01	56·14	41·84	15·25	..	3·39	2·65	1·58	2·40	1·53	32·70
Gindie State Farm ...	0·68	2·59	1·88	0·63	...	9 94	3·45	...	Nil	1·54	2·17	2·17	3·18
Herberton	5·29	2·82	1·47	1·40	2·20	2 36	...	1·30	0·53	·78	1·87	3·00	26·43
Hughenden	5·78	1·84	3·52	Nil	0·74	6 64	...	Nil	0·13	Nil	2·29	0·55	3·12
Kamerunga State Nurs.	...	...	...	...	...	...	...	...	...	...	...	...	...
Mackay	2·08	8·04	·93	3·56	3·42	5·51	...	0·23	0·2	7·28	3 03	1·66	26·17
Mossman	6·06	18·32	17·60	6·40	2·78	8·88	1·33	1·98	1·80	5·49	6·88	1·90	22 75
Rockhampton	2·50	3·24	·14	0·01	1·98	8·38	...	Nil	Nil	6 87	1·45	2·83	16·56
Townsville	1·64	7·57	6·35	4·51	0·63	4·49	...	0·17	Nil	·64	2·69	1·38	11·69
South.													
Brisbane	1·85	2·13	1·03	0·72	0·20	7·22	...	1·32	0·43	5·85	3·69	5·20	4·94
Sandgate	...	...	...	...	...	...	...	...	...	...	4·25	5·38	7·24
Bundaberg	3·96	2·47	...	Nil	1·33	10·23	1·76	0·78	0·22	3 74	3·14	1·01	45 48
Bungeworgorai (Roma State Farm)	0·73	...	2·19	Nil	...	7·06	...	0·33	0·22	1·96	2·21	...	3·51
Crohamhurst	5·62	8·72	13·73	1·77	1·39	9·99	1·67	1·35	0·19	6·66	4·21	8·24	17·41
Dalby	1·76	2·58	·53	Nil	Nil	4·76	...	0 68	0·87	3 36	1·98	1·18	2·95
Esk	1·38	8·26	·22	0·36	0·11	7·43	...	1·13	0·52	2·57	3·80	3·88	3·96
Gatton Agric. College	3·56	3·31	7·86	1·35	...	6·63	1·84	1·04	0·53	4·99	2·59	3·97	4·71
Glasshouse Mountains	3·37	6·99	13·15	0·31	0·98	7·85	1·86	1·14	0·8	6 60	4·38	3·36	17·82
Gympie	2·92	4·47	·15	0·37	0·52	2·63	...	0 92	Nil	2·94	2·28	2·49	18·17
Ipswich	1·87	3·00	·41	0·30	Nil	3·93	...	1·02	0·49	4 04	3·34	2·74	3·93
Maryborough	2·39	3·93	·11	0·32	1·09	9·12	...	1·26	Nil	5·54	4·07	3 36	23 57
Roma	0·74	0·76	·85	0·03	Nil	7·96	...	0·77	0·28	1·95	2·81	0·54	3·43
Tewantin	5·60	4·25	·85	0·80	8·46	8·72	...	0·82	Nil	6·02	4·68	3·19	14·88
Toowoomba	...	...	·52	0·66	0·16	6·75	...	1·05	1·08	5·41	2·05	3·91	7·45
Warren State Farm ...	0·82	1·75	2·04	0·22	1·28	9 51	3·35	...	...	...	...	0·75	12·98
Warwick	1·57	3·45	·56	0·02	0·9	5·69	...	1·37	1·50	3·75	2·65	2·37	2·50
Woodford	...	...	...	...	...	9·78	...	...	0·53	6·78	2·52	4·83	9·79
Yandina	5·95	4·84	·95	0·88	1·39	7·42	...	1·25	0·18	5·7	...	?1·30	20 63

NOTE.—The rainfall data in this table are compiled from telegraphic reports, and must be considered as approximate only. * Incomplete. Report for 31st not received owing to telegraphic interruption.

GEORGE G. BOND,
Divisional Officer.

Entomology.

THE POTATO MOTH.

In response to a request from the Lower Burdekin Farmers' Association to the Department of Agriculture and Stock for advice concerning the ravages of the potato moth in the Ayr district, the following memorandum by Mr. Edmund Jarvis, Assistant Entomologist, was submitted, and forwarded to Mr. Hoey, secretary of the association:—

The insect pest above alluded to and popularly termed "moth-fly," "potato tuber moth," or "potato moth," is known to science as *Phthorimaea operculella*, and is a widely distributed and destructive insect, being a serious pest in various parts of Australia, Tasmania, New Zealand, India, China, and Africa.

The eggs of the moth are not unlike small pearls in appearance, and less than half the size of a pin's head. They are usually laid in the eyes of exposed tubers, but also on the leaves and haulms. As soon as the larvæ are hatched, they at once commence to search for a suitable place in which to bore into the vine or tuber, preferring a spot where the skin happens to be broken, but if no such place occurs, entering by the eyes, where the skin is very thin. When the larva is fully grown, it transforms into a pupa, after first enveloping itself in a silken cocoon, choosing either the entrance of an old burrow, a mass of dead leaves, under or in a cleft of a dry clod of earth, in cracks of the bins, or the sides of the sacks, or on the smooth or rough surface of a tuber, &c.

The female moth is about three-eighths of an inch long, but the male is much smaller. Both are grey in colour with silvery bodies. This grey colour has been aptly described as being produced by a mixing or mingling of dark, light, and faint brick-coloured blotches, all of which vary greatly in size. There is a noticeable black area near the middle of the back of the females, and a darker fringe at the tips of the primary wings of the males. From experiments conducted in this office during August, 1909, it was found that the transformations of the species (from the time of laying of the first egg to emergence of the perfect insect) occupy twenty-seven days.

The above remarks will afford a short sketch of some of the most interesting and perhaps least known points in the economy of this species.

REMEDIES.

These must necessarily be of a preventive character, and, needless to say, are always best if adopted before the insect gets a good footing in any locality. Every potato-grower should make himself thoroughly

familiar with the following list of control methods, that have been advocated by leading entomologists of the day, and are the outcome of practical research work:—

The Tuber.

Planting—

1. Plant potatoes, when possible, in a firm soil, such as a stiff loam or sand. If the only available soil be loose in nature, plant deeply.

2. When flat cultivation is followed keep the soil well hoed, and, if hilling up be preferred, cover the tubers with well-pulverised soil. No clods should be allowed, or the moths will crawl down among them and deposit eggs on the potatoes.

Digging—

3. Whilst digging, separate infested potatoes from those appearing sound, and destroy the former. Boil such damaged potatoes before giving them to pigs or fowls.

4. Under no conditions should dug tubers be left in the field over night, as during the hours of darkness the moth is actively engaged in egg-laying. The bags should, therefore, be sewn up immediately after filling and conveyed to suitable storage without delay.

Storing—

5. Do not store tubers in an open shed, but in a room having the walls and floor made of closely fitting boards, and do not cover them with litter of any kind.

6. Stir them often whilst in store, keeping a good lookout at the time for moths or pupæ.

7. Air-slaked or gas lime at the rate of 30 bushels per acre has proved beneficial in preventing attack, and when sprinkled in pits, prevents infestation.

8. If stored potatoes are found to be infested with this moth, treat them with carbon bisulphide, using from 1½ to 2 lb. to every 1,000 cubic feet of air space, and repeat the treatment as often as the adult moths begin to appear.

The Foliage, Etc.

9. Spraying with tar water has been advocated as a preventive before infestation takes place. This spray is prepared as follows:—Coal tar, ½ lb.; water to mix, 1 gallon. Dilute to make 50 gallons of spraying material.

10. Remove all stalks and foliage as soon as possible after harvesting the crop, and burn same without delay.

11. Adopt a system of clean culture, and destroy all weeds and any night shades that may be found growing in the vicinity of potato patches.

NOTES ON THE BEAN FLY.

(*AGROMYZA PHASEOLI.*)

By E. JARVIS, Assistant Government Entomologist.

[CONTINUED FROM FEBRUARY.]

The author has noticed that larvæ hatched from eggs deposited in the upper leaves of Tonga beans generally mature and pupate in the swollen bases of the leafstalks, these being softer and seemingly more palatable than the firmer tissues of the main stem. Leaves affected in this way are liable to become broken by winds, and, when hanging withered among green foliage, afford conspicuous evidence of the presence of bean-flies.

As soon as the maggots are fully grown, they transform into pupæ, one of which is shown much enlarged on the accompanying plate, and at this stage are brownish-yellow with the ends darker, and provided with a pair of anchor-like hooks.

They are generally found packed away in fissures or inequalities of the damaged stem, or under dead skin that has partially peeled and curled up on the surface, such stem injuries being a usual feature in beans that have suffered severely.

DISTRIBUTION, NATURAL ENEMIES, ETC.

This troublesome pest is evidently on the increase, and slowly but surely extending its range both in Queensland and New South Wales.

In our own State some idea of the extent of its ravages may be gathered from the following notes, taken from the annual reports of the Government Entomologist, Mr. Tryon:—

1903-4.—Was reported from Brisbane and Bundaberg.

1904-5.—Brought frequently under notice of this office as committing serious depredations in the Moreton district; and has also formed the subject of complaint owing to its habit of victimising French, Lima, Madagascar, as well as other related plants at Townsville.

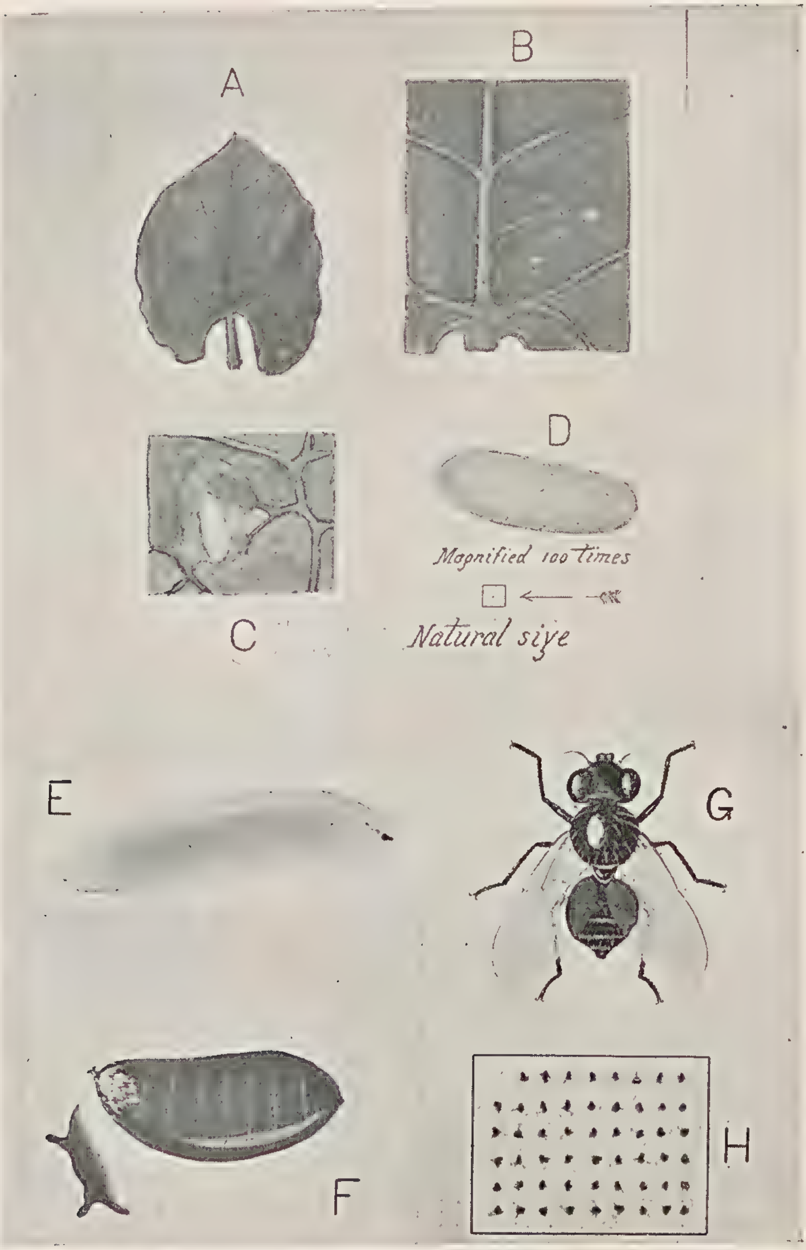
1907-8.—Especially harmful in Southern Queensland during March, as represented by several applicants.

1908-9.—Very harmful in Southern Queensland during February and March.

1909-10.—Attacking cowpeas at Brisbane, Nambour, Cairns, &c.

1911-12.—Occasioned much damage to Canadian Wonder (*Phaseolus*) and related legumes, even in the newer agricultural districts, of which Woodford and Gympie are centres; being especially harmful in March.

The New South Wales Government Entomologist has published an interesting account of this fly ("Agricultural Gazette, N.S.W., Feb., 1911), in which he alludes to its first appearance, which occurred in the Gosford district in 1898; and mentions that in the year 1910 it appeared



A.—Punctured leaf (natural size).
B.—Surface of leaf (slightly magnified).
C.—Portion of leaf with egg in puncture (magnified).
D.—Egg (highly magnified).
E.—Larva (magnified about 20 times).
F.—Pupa (magnified about 20 times).
G.—Bean fly (magnified about 15 times).
H.—Bean flies (natural size).

Plate 30.—Bean Fly (*Agromyza phaseoli* .

as a very serious pest, and spread over a very much larger area than in former years; and is also "spreading northwards and has gained a footing in the gardens round Wyong."

"From the way it attacks the Wamberal market gardens," says Mr. Froggatt, "it evidently does not travel very rapidly into patches of freshly cultivated land, but once it gets into a bean field, it usually appears in the following seasons."

The history of this pest is only another illustration of the danger that may easily ensue when a native insect happens to discover some introduced vegetable to be more palatable than its natural food.

Various wild leguminous plants doubtless furnish an outside source of supply to the larvæ, but have not yet been discovered either in Queensland or New South Wales.

It is interesting to be able to record that two small hymenopterous insects have more than once been bred at this office from pupæ of bean-flies in sufficient numbers to lead one to infer that these tiny parasitic insects are doing splendid control work.

REMEDIES.

1. Grow a small catch-crop of Canadian Wonder beans very early in the season to meet the first brood of flies, and when these plants are found, upon examination, to be harbouring good-sized grubs, pull them up and burn them without delay.

2. Root up and burn all old bean plants immediately they have ceased to become profitable.

This and the preceding method of control are of the greatest importance, and will well repay growers for any trouble or loss of time incurred.

3. Protect the stems by hilling them up with soil until covered. (Mr. Froggatt says that Sydney market gardeners adopt this plan, which, in good growing weather, enables a damaged plant to root afresh above the injured portion.)

4. Mr. Tryon reports that the best results have been derived from growing the beans in a shallow trench and applying to the soil (so as not to touch the plants) whitewash made from acetylene refuse, or lime slaked with water, containing carbolic acid or phrenyle. Some benefit, he tells us, has been derived from "turning some of the soil back, and either painting the stalks with simple whitewash, to which a little glue has been added to promote adhesion, or sprinkling lime around them."

On small areas, for example, it might be worth while to try—as an experiment—stretching three or four lengths of coarse packing-twine over a row of dwarf beans close to the upper leaves, having first dipped the string in some attractive sticky solution. A few sticks stuck in the ground at intervals would afford all the support needed, and the device, being simple and inexpensive, would, I think, be worth trying.

Other methods of trapping this insect could no doubt be devised by those who have ample opportunity of observing the habits of bean-flies.

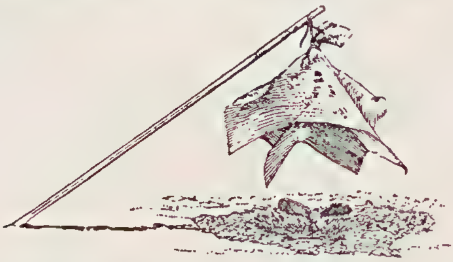
Plate 31.—Young French Beans (Canadian Wonder) destroyed by the Bean Fly (*Agromyza phaseoli*).

Such remedies, however, and the trial of poisoned baits, still offer us a wide field for future experimentation, that will in time lead, perhaps, to the eradication of the bean-fly, or, at any rate, to its being compelled to rank as a pest of slight economic importance.

General Notes.

A SIMPLE DEVICE AGAINST THE PUMPKIN BEETLE.

In an interesting article on "Coff's Harbour and Dorrigo," in the January issue of the "Agricultural Gazette" of New South Wales, it is stated that Mr. Campbell, a farmer in the district, has tried various remedies for the destruction of the pumpkin beetle. Arsenate of lead



has proved useless this year. Paris green kept them off one year, but the next year it was a failure. The only vines which have prospered this season are those protected by a piece of paper hanging by a string from a stick driven into the ground in an inclined position as shown in the sketch. The wind blows the paper about over the young vine, and this keeps the beetles off.

THE SUGAR INDUSTRY.

EXCISE AND BOUNTY PAYMENTS.

On the 9th of last month the following return was made available by the State Treasurer, showing the position of the sugar-grower in respect of Excise and Customs payments on sugar within the Commonwealth. The return also shows the amount of bounty paid out, and the net return:—

Year.	Excise.	Import Duty.	Total.	Bounty	Net Return.
	£	£	£	£	£
1902-3	261,517	502,931	764,448	60,827	703,621
1903-4	272,117	483,516	755,633	90,806	664,827
1904-5	503,627	174,884	678,511	121,408	557,103
1905-6	536,079	109,327	645 406	148,106	497,360
1906-7	546,590	122,298	668,888	328,210	340,678
1907-8	741,928	28,686	770,614	577,148	193,466
1908-9	750,776	113,017	863,793	477,090	386,703
1909-10	548,716	473,745	1,022,461	402,132	620,329
1910-11	794,645	139,728	934,373	630,762	303,611
1911-12	748,670	244,663	993,333	543,503	449,830
1912-13 (Estimate)	436,000	741,437	1,177,437	405,000	772,437
	6,140,665	3,134,232	9,274,897	3,784,992	5,489,905
1901-2	189,545	591,264	780,809	...	780,809
	6,330,210	3,725,496	10,055,706	3,794,992	6,270,714

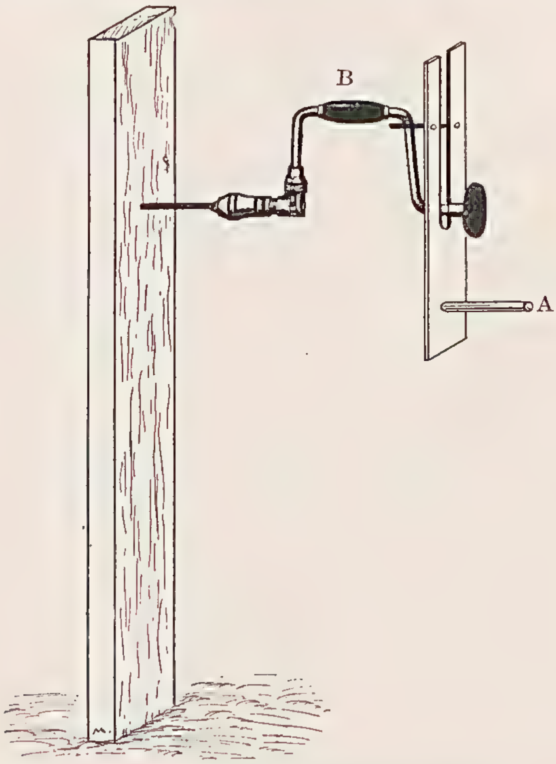
COWS CHEWING BONES.

The cause of bone-chewing is generally due to the want of lime salts in the pasture or fodder. To overcome the habit, a salt lick should be provided, and the following is recommended by Mr. A. H. Cory, M.R.C.V.S.L.:—

Bonemeal, 1 lb.; carbonate of iron, 4 oz.; gentian, 4 oz.; common salt, 4 oz.; fenugreek, 4 oz. Mix thoroughly, and allow 1 tablespoonful to each animal three times daily.

A GOOD DEVICE FOR BORING HOLES IN POSTS.

Mr. F. Patchell, Mundubbera, sends the accompanying sketch of a device for converting an ordinary brace into a jigger for boring large holes in fencing-posts for barbed wire. The method is to attach a piece of wood having a slot cut in it to the brace, by means of two bolts. This



Brace Attachment for Boring Posts.

attachment has a hand piece at the upper end. Standing side on, the operator grips the handle A with his right hand, and at B with his left hand. Thus he has a fac-simile of the tool he would have to buy from the blacksmith, and which is of no further use when all the required holes are bored.

Answers to Correspondents.

QUEENSLAND WHEAT HARVESTS FROM 1896 TO 1911.

"AGRICOLA," Warwick—

The annual yields of wheat for the past sixteen years, as shown by the statistics published by the Government Statistician for the year 1911, are as follows:—

Year.	Produce.	Average.	Year.	Produce.	Average.
	Bushels.	Per acre.		Bushels.	Per acre.
1896	601,254	17·34	1904	2,149,663	14·24
1897	1,009,293	17·46	1905	1,137,321	9·53
1898	607,012	14·86	1906	1,108,902	9·68
1899	614,414	11·69	1907	693,527	8·41
1900	1,194,088	15·06	1908	1,202,799	14·87
1901	1,692,222	19·40	1909	1,571,589	13·41
1902 (drought year) ...	6,165	3·28	1910	1,022,373	9·58
1903 (record)	2,436,799	17·65	1911	285,109	6·64

For the full returns of the harvest of 1912, we shall have to await the Government Statistician's report next July.

It will be noticed that, with two exceptions, the average yields per acre for the nine years preceding 1905 were much higher than in the following years. This may be accounted for in many ways—such as rust, want of rain at growing time, hail, &c. But also it should be remembered that wheat has been grown in many cases on the same land year after year, without restoring to the soil the elements extracted by the crop.

The experience for 1911 was the least satisfactory for any season since that of practically total failure in 1902, the culmination of the great drought. Very dry weather during the period best suited for sowing was the chief cause, although adverse conditions of a different character—frosts and storms in a few instances—intensified the mischief.

THE RABBIT'S NEW NAIL.

RABBITER.—

The following cutting from "The Enquirer," which you forwarded last week, has been submitted to the Curator of the Queensland Museum, and his reply is attached:—

"A very curious instance of the way in which species are modified in accordance with their needs is furnished by W. G. Jordan in 'The Kingship of Self-Control,' to which the 'Animals' Friend' draws attention. 'About forty-five years ago three pairs of enterprising rabbits were introduced into Australia. To-day, the increase of these six immigrants may be counted by millions. They became a pest to the country. Fortunes have been spent to exterminate them. Wire fences many feet

high and thousands of miles long have been built to keep out the invaders. The rabbits had to fight awful odds to live, but they have now outwitted man. They have developed a new nail—a long nail by which they can retain their hold on the fence while climbing. With this same nail they can burrow six or eight inches under the netting, and thus enter the fields that mean food and life to them. They are now laughing at man. Reserve power has vitalised for these rabbits latent possibilities, because they did not tamely accept their conditions, but in their struggle to live, learned *how* to live.' "

Dr. R. Hamlyn-Harris, Director of the Queensland Museum, says:—

" So many variations have been noted in the structures of rabbits that we should have considerable hesitancy in giving a direct negative to the story of an abnormal development of a rabbit's nail. Thus, rabbits introduced into certain localities, such as the Island of Porto Santo, have developed distinct characteristics. We have no definite record, however, of any such modification in Australian specimens, and the story probably arose from an individual abnormality. As an instance of this kind, may be instanced that rabbits are occasionally found in which the two front teeth have grown into tusk-like protuberances describing a short arc in front of the mouth. But, putting these abnormal growths on one side, we have no knowledge whatever of a widespread modification, such as the paragraph on the marvellous ' fence-climbing' nail suggests."

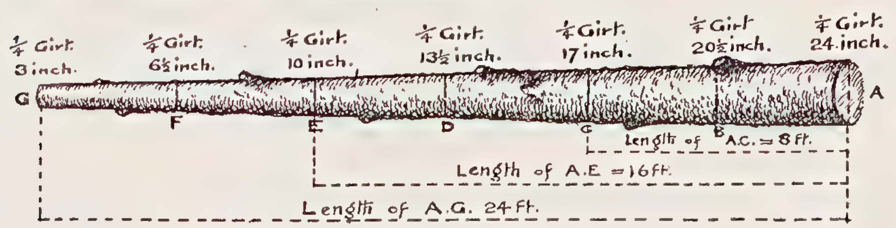
MEASURING A LOG.

"CURIOUS," Tewantin—

The "paradox" was published in this journal in October, 1900. As you have no back numbers, we reprint the article, which is very interesting, as showing how two measurements may differ in their results and yet both be quite correct.

MEASURING LOG TIMBER—A PARADOX.

In the case of expensive timber such as ebony, cedar, and building timbers of European forests, the addition or subtraction of a few cubic feet make a remarkable difference in the price received for a log. It is quite possible for two persons to measure a log by the same method, and although their measurements differ by several solid feet, yet for both to be correct. This sounds strange, but it can be proved. We will suppose a very tapering log, as shown in the diagram, 24 feet in length with a quarter girt of 24 inches at the butt, and 3 inches at the head. First let us measure it as a single log—



Our log measures 24 feet in length, and one-fourth of the girt at the butt A is 24 inches; the quarter girt at the top G is 3 inches, and the quarter-girt in the middle at D is 13½ inches. From these dimensions AG is found to contain 30 feet 4 inches 6 parts.

THE SAME LOG MEASURED IN THREE PIECES.

Now let us cut the log into three equal parts, AC, CE, EG.

First we take AC, which is 8 feet long, 8 feet in girt at the butt-end A, 5 feet 8 inches in girt at the top C, and 6 feet 10 inches in girt in the middle B. Take the quarter of all these dimensions, and we have the following quarter-girts: At A, 24 inches; at C, 17 inches; and at B, 20½ inches. From these figures the solid content of AC is found to be 23 feet 4 inches, or only 7 feet less than the whole log AG measured together, so that by cutting off 16 feet at the top, that is from C to G. which is no less than two-thirds of the whole length, you do not lose quite 7 solid feet of timber.

Next we take the middle log CE, also 8 feet long, the quarter-girt at the butt-end C is 17 inches, and at the top end E, 10 inches. The middle quarter-girt at D is 13½ inches. Working with these figures we find the log CE contains 10 cubic feet 1 inch and 6 parts. Thirdly, the remaining log EG is also 8 feet long, and the quarter-girt at E is 10 inches, at G 3 inches, and in the centre at F, 6½ inches. These data work out to show that EG contains 2 cubic feet 4 inches 2 parts. Putting these results in tabular form—

	Cubic feet.	Cubic inches.	Parts.
AG, the whole log, measured singly makes ..	30	4	6
AC, ⅓ of the log " " " ..	23	4	0
CE, ⅓ " " " " ..	10	1	6
EG, ⅓ " " " " ..	2	4	2
Total contents	35	9	8

Thus the gain by cutting the log into three pieces and measuring each separately is a little more than 5 cubic feet 5 inches.

THE SAME LOG MEASURED WITHOUT THE BUTT-END.

Again, let us try another plan. Suppose 8 feet to be cut off the butt-end—viz., from A to C. Let us then measure the remainder, CG, which is 16 feet. The side of the square at E is 10 inches. The resulting measurement is 11 feet 1 inch 4 parts.

THE SAME PIECE MEASURED IN TWO DIMENSIONS.

Next, suppose the log cut through at E. First measure CE. 13½ inches is the side of the square at D. The length is 8 feet. Result: 10 feet 1 inch 6 parts. Now we measure the piece EG. The side of the square at F is 6½ inches and the length 8 feet. The content is 2 cubic feet 4 inches 2 parts.

So that the whole piece CG measures to one solid foot and a-half more, when it is measured at twice, than when it was measured in one piece.

Now let us try the AE by itself and see what it will produce. AE, observe, is 16 feet long and one-fourth of the girt in the middle at C is 17 inches. Taking out the quantities, AE will be found to contain 32 feet 1 inch 4 parts of timber; notwithstanding 8 feet at the top, from E to G, is cut off and is not taken into account at all, whereas, when this top was left on, the whole, from A to G, measured by 30 feet 4½ inches; so that by cutting off and rejecting 8 feet at the top we gain near 2 feet of timber.

In the case of timber worth to the timber-getter only 4s. per 100 feet, the difference in measurement would matter little, and besides he would not be likely to cut a 24-feet pine log into 12-feet pieces unless it were of very large girth. But where cedar or any of the very expensive timbers, such as ebony, mahogany, walnut, sandalwood, rosewood, and many other timbers valuable for cabinet-makers and upholsterers, the question of a few feet makes a very great difference. For example, if the log depicted in the diagram were worth 2s. per foot, it would be worth £3 11s. 6d. when measured in three pieces, but only £3 0s. 6d. when measured in one piece. Thus 11s. are gained by making one log into three.

ANALYSES OF GRASSES.

I.J., Blackall Range—

All the information at the disposal of the Department on the above subject has been forwarded to you in pamphlet form.

YAMS.

Enquirer, Isis—

The cultivation of yams is described in the January issue of the Journal (1913), which has been forwarded to you, as requested. The cultivation of yams you will also find in "Market Gardening," issued by this Department.

LUCERNE.

Enquirer, Townsville—

Sow lucerne immediately after the young weed growth is destroyed at the latter end of the rainy season. March and early April are seasonable periods of the year in the North. Seed may also be sown during the winter if conditions are moist enough, so that the young plants may be thoroughly established before the hot weather sets in.

SHEEP MANAGEMENT, "BOOK OF ALFALFA."

W. C. Smith, Killarney—

Write to Mr. W. G. Brown, Sheep and Wool Expert, the Grange, Toowoomba, who will give you any information you require on sheep-raising. Read also his articles on "The Farmer's Sheep," begun in this Journal in August, 1912, and in all subsequent numbers to date. We forwarded you in February the first five of Mr. Brown's articles.

WHEAT FOR GRAIN AND HAY, PEANUTS, &c.

E. W. STILLER, Downfall Creek, Miles—

1. The best mid-season wheats for your district are John Brown and Amby. The so-called spring varieties best for you are Bunge No. 1 and Gluyas.

2. For hay, the two first varieties and Allora Spring.

3. Cretan and Bald Medeah are two rust-resisting varieties. They cannot be recommended as they are Macaroni wheats, and do not compare with other well-known wheats grown under dry conditions.

4. Bunge No. 1 has proved to be the most consistent variety as far as yield is concerned, as, although rust-resisting on account of its quick-maturing habit of growth, it combines a degree of resistance to the parasite far superior to many commonly grown sorts. Graded seed true to name is procurable from the manager of the State Farm, Bungeworgorai, Roma, at 5s. per bushel f.o.b., Bungeworgorai.

5. The best time to sow Lucerne is when one-third of the crop is in flower.

6. To ascertain when peanuts are ready for harvesting, examine the haulms and nuts, which, when mature, present unmistakable signs of the fact. The crop should be lifted before there is a tendency for the root masses to decay.

7. You will not be able to grow bananas satisfactorily at Miles. The banana stem, when it has borne one bunch, bears no more. It is then cut down, and succeeding suckers take up the bearing. Each sucker which has borne fruit is cut down, and fresh suckers take their place for a series of years.

8. You are quite right about Federation being a variety of wheat very liable to rust. It is for this reason (although such a large sort) not to be depended upon, as many crops promising eight to ten bags to the acre before rust appeared, have given as low as two to three bags afterwards. From a consensus of opinion arrived at after collecting data concerning the variety, it is quite apparent that a wheat grower is taking abnormal risks in adopting Federation as a standard kind.

PROTECTING PINEAPPLES FROM FROST BY SMOKE.

PINEAPPLE, PALMWOODS—

By interposing a stratum of smoke between the pines and the sky, great radiation of heat from the soil is prevented, and consequently the subsequent lowering of the temperature to a dangerous point. Some have an idea that the damage is caused by the subsequent thawing of the frosted plants by the sun, and that if the sun were kept off, the plants

would not be injured. This view is quite erroneous. The freezing of the cells in the green parts of the plant causes them to expand and burst. From that moment, the affected part is dead, and, sun or no sun, will never come to life again. As to the best time to apply the smoke remedy, it is generally recognised that about daybreak is the most dangerous period for the pines. Generally, from 3 a.m. to sunrise may be looked upon as the critical period. The fires, then, must be lighted just before the abovementioned time. Next comes the choice of materials for smoke-production. Tar is good, but expensive, as a large supply has to be kept ready for replenishing the fires. The material that gives the greatest satisfaction is damp straw, half-dried weeds, &c., heaped on a foundation of burning timber. These make a dense smoke, burn slowly, and are inexpensive. The damp material should be laid in heaps round the field; a few chains apart is near enough with big heaps. Should the wind suddenly change, the heaps on the opposite side of the field must be kept going, otherwise the protection of the smoke is lost, and so will be the pines.

TIMES OF SUNRISE AND SUNSET AT BRISBANE—1913.

Date.	January.		February.		March.		April.	
	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	4·57	6·46	5·21	6·42	5·40	6·20	5·57	5·46
2	4·58	6·46	5·22	6·41	5·41	6·19	5·58	5·45
3	4·58	6·46	5·22	6·41	5·42	6·18	5·58	5·44
4	4·59	6·46	5·23	6·40	5·42	6·17	5·59	5·43
5	4·59	6·46	5·24	6·40	5·43	6·16	5·59	5·42
6	5·0	6·47	5·25	6·39	5·44	6·15	6·0	5·41
7	5·1	6·47	5·25	6·38	5 44	6·14	6·0	5·40
8	5·2	6·47	5·26	6·38	5·45	6·13	6·1	5·39
9	5·2	6·47	5·27	6·37	5·45	6·12	6·1	5·38
10	5·3	6·47	5·28	6·36	5·46	6·11	6·2	5·37
11	5·4	6·47	5·28	6·36	5·46	6·10	6·2	5·35
12	5·5	6·47	5·29	6·35	5·47	6·9	6·3	5·34
13	5·5	6·47	5·30	6·34	5·48	6·7	6·3	5·33
14	5·6	6·47	5·30	6·33	5·48	6·6	6·4	5·32
15	5·7	6·47	5·31	6 33	5·49	6·5	6·4	5·31
16	5·8	6·47	5·32	6 32	5·49	6·4	6·5	5·30
17	5·9	6·47	5·33	6·31	5·50	6·3	6·6	5 29
18	5·9	6·47	5·33	6·30	5·50	6·2	6·6	5·29
19	5·10	6·46	5·34	6·29	5·51	6·1	6·7	5·28
20	5·11	6·46	5·35	6·28	5·51	6·0	6·7	5·27
21	5·12	6·46	5·35	6·28	5·52	5·59	6·8	5·26
22	5·12	6·46	5·36	6·27	5·52	5·57	6·8	5·25
23	5·13	6·46	5·37	6·26	5·53	5·56	6·9	5·24
24	5·14	6·45	5·37	6·25	5·53	5·55	6·9	5·23
25	5·15	6·45	5·38	6·24	5·54	5·54	6·10	5·22
26	5·16	6·45	5·38	6·23	5·54	5·53	6·10	5·21
27	5·17	6·44	5·39	6·22	5·55	5·52	6·11	5·20
28	5·17	6·44	5·40	6 21	5·55	5·51	6·12	5·19
29	5·18	6·43	...	...	5·56	5·50	6·12	5·18
30	5·19	6·43	...	...	5·56	5·48	6·13	5·17
31	5·20	6·42	...	...	5·57	5·47	...	...

PHASES OF THE MOON.

			H. M.
7 Jan.	●	New Moon	8 28 p.m.
16 ,,	☾	First Quarter	2 2 a.m.
23 ,,	○	Full Moon	1 40 ,,
29 ,,	☽	Last Quarter	5 34 p.m.
6 Feb.	●	New Moon	3 22 p.m.
14 ,,	☾	First Quarter	6 34 ,,
21 ,,	○	Full Moon	12 3 ,,
28 ,,	☽	Last Quarter	7 15 a.m.
8 Mar.	●	New Moon	10 22 a.m.
16 ,,	☾	First Quarter	6 58 ,,
22 ,,	○	Full Moon	9 56 p.m.
29 ,,	☽	Last Quarter	10 58 ,,
7 Apr.	●	New Moon	3 48 a.m.
14 ,,	☾	First Quarter	3 39 p.m.
21 ,,	○	Full Moon	7 33 a.m.
28 ,,	☽	Last Quarter	4 9 p.m.

The Markets.

PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR FEBRUARY, 1913.

Article.		FEBRUARY. Prices.
Bacon, Pineapple	lb.	8½d. to 10½d.
Bran	ton	£5 5s.
Butter	cwt.	96s.
Chaff, Mixed	ton	£5
Chaff, Oaten (Victorian)	"	£6 15s. to £7
Chaff, Oaten (Local)	"	£4 10s.
Chaff, Lucerne	"	£4 15s. to £5
Chaff, Wheaten	"	£5 10s.
Cheese	lb.	6½d.
Flour	ton	£9
Hay, Oaten (Victorian)	"	£8
Hay, Lucerne	"	£3 10s.
Honey	lb.	2¾d. to 3d.
Maize	bush.	3s. 7d.
Oats	"	4s.
Pollard	ton	£5 5s.
Potatoes	"	£6 10s. to £7
Potatoes, Sweet	cwt.	2s. to 2s. 6d.
Pumpkins	ton	£2 5s.
Wheat, Milling	bush.	3s. 10d. to 4s.
Onions	ton	£7 10s.
Hams	lb.	1s. 1d.
Eggs	doz.	1s. 2d. to 1s. 6d.
Fowls	pair	2s. to 3s. 6d.
Geese	"	6s.
Ducks, English	"	2s. 6d. to 3s.
Ducks, Muscovy	"	4s. to 5s.
Turkeys (Hens)	"	9s. to 10s. 6d.
Turkeys (Gobblers)	"	12s. to 21s.

SOUTHERN FRUIT MARKETS.

Apples (Choice—local), per bushel case	6s. to 10s. 6d.
Apples (American)	12s. 6d. to 15s.
Apples (Cooking), per gin case	2s. to 8s.
Apricots, per half-gin case	3s. to 5s. 6d.
Bananas (Fiji), G.M., per case	10s. to 13s.
Bananas (Fiji), G.M., per bunch	3s. to 8s.
Bananas (Queensland), per bunch	1s. to 4s.
Bananas (Queensland), per case	7s. to 8s.
Cherries, per 12-lb. box	...
Cocoanuts, per dozen	2s. 6d. to 3s.
Lemons (local), per gin case	6s. to 7s. 6d.
Lemons (Italian), per case	14s.
Mandarins (Emperor), per case	2s. 6d. to 5s.
Mangoes, per bushel case	9s. to 10s.
Nectarines, per case	3s. 6d. to 5s.
Oranges (Navel), per gin case	4s. to 7s.
Oranges (other), per case	3s. to 6s.
Papaw Apples, per bushel case	4s. to 5s.
Passion Fruit, per half case	3s. to 4s. 6d.
Peaches, per quarter-case	2s. 3d. to 3s. 6d.

SOUTHERN FRUIT MARKETS—*continued.*

Article.	FEBRUARY. Prices.
Peanuts, per lb.	4d.
Pears, per gin case	3s. to 7s.
Pineapples (Queensland), common, per case	3s. 6d. to 6s.
Pineapples (Queensland), Ripley's, per case	3s. 6d. to 6s.
Pineapples (Queensland), Queen's, per case	5s. to 7s.
Plums, per case	4s. to 6s. 6d.
Rockmelons (Queensland), per half case	4s. to 6s.
Tomatoes, per half case	1s. 3d. to 4s.
Watermelons (Queensland), per dozen	3s. to 8s.
Cucumbers (Local), per bushel case	4s. to 6s.

PRICES OF FRUIT—TURBOT STREET MARKETS.

Article.	FEBRUARY. Prices.
Apples (Eating), per case	5s. to 10s. 6d.
Apples (American Winesaps)	12s. 6d. to 15s.
Apples (Cooking), per case	6s. to 8s.
Bananas (Cavendish), per dozen	2d. to 4d.
Bananas (Sugar), per dozen	1½d. to 2d.
Grapes, per lb.	2½d. to 4d.
Lemons, per case	6s. to 7s. 6d.
Lemons (Italian), per case	...
Mandarins, per case	2s. 6d. to 5s.
Mangoes, per case	1s. to 3s.
Nectarines, per case	3s. 6d. to 5s.
Oranges (Navel), per case	4s. to 7s.
Oranges (other), per case	4s. to 6s.
Papaw Apples, per case	1s. 6d. to 2s. 6d.
Passion Fruit, per quarter-case	2s. to 4s.
Peaches, per quarter-case	2s. to 4s. 6d.
Peanuts, per lb.	3d.
Persimmons, per case	1s. to 2s. 6d.
Pineapples (Ripley), per dozen	1s. to 2s. 6d.
Pineapples (Rough), per dozen	6d. to 2s.
Pineapples (Smooth), per dozen	1s. 6d. to 2s. 6d.
Plums, per case	4s. to 6s. 6d.
Rockmelons, per doz.	1s. to 4s.
Tomatoes, per quarter-case	1s. to 2s. 6d.
Watermelons, per dozen	1s. to 8s.

TOP PRICES, ENOGGERA YARDS, JANUARY, 1913.

Animal.	JANUARY. Prices.
Bullocks	£9 5s. to £10 15s.
Cows	£6 7s. 6d. to £7 2s. 6d.
Merino Wethers	19s.
Crossbred Wethers	20s. 3d.
Merino Ewes	14s. 9d.
Crossbred Ewes	17s. 3d.
Lambs	15s.
Pigs (Porkers)	...

Orchard Notes for April.

THE SOUTHERN COAST DISTRICTS.

The gathering and marketing of citrus fruit, as well as of pines, bananas, custard apples, persimmons, &c., is the principal work of the month. In the Notes for March attention was drawn to the necessity for keeping all pests in check, particularly those attacking the ripening fruit. As it is the height of folly to look after the orchard thoroughly during the growing period of the crop and then to neglect the crop when grown, every possible care must be taken to keep fruit fly, peach moth, black brand, or other pests that destroy or disfigure the fruit in check, and this can only be accomplished by combined and systematic action. Citrus fruit at this time of the year often carries badly, as the stem is tender, easily bruised, full of moisture, and, consequently, very liable to the attacks of the blue mould fungus, which causes specking. The loss from this cause can be lessened to a considerable extent by carefully attending to the following particulars:—

1st. Never allow mouldy fruit to hang on the trees or to lie about on the ground. It should be gathered and destroyed, so that the countless spores which are produced by the fungus shall not be distributed broadcast throughout the orchard, infesting many fruit, and only waiting for a favourable opportunity, such as an injury to the skin by an insect or otherwise, combined with favourable weather conditions (heat and moisture), to start into growth.

2nd. Handle the fruit carefully to prevent bruising. Cut the fruit, don't pull it, as pulling is apt to plug the fruit—that is to say, to either pull the stem out or injure the skin round the stem—and a fruit so injured will go mouldy.

3rd. Sweat or dry the fruit thoroughly; if the weather is humid, laying the fruit out in the sun on boards or slabs is a very good plan.

4th. After sweating, examine the fruit carefully, and cull out all bruised or punctured fruit, and only pack perfectly sound dry fruit. It is better for the loss to take place in the orchard than for the loss to take place in the case in transit.

5th. If the mould is very bad, try dipping the fruit for a few seconds in a 2 per cent. solution of formalin. This will kill the spores, and if the fruit is placed in the sun and dried quickly before packing there will not be much chance of its becoming reinfested.

Don't gather the fruit too green, especially such varieties as the Beauty of Glen Retreat Mandarins, as immature fruit spoils the sale of the good article.

If the orchard has not been cleaned up after the summer rains, do so now; and do any other odd jobs that may be required, such as mending fences, grubbing out dead or worthless trees, cleaning out drains, &c.

Strawberry planting may be continued, and where new orchards are to be planted continue to work the soil so as to get it into the best possible tilth.

THE TROPICAL COAST DISTRICTS.

Clean up the orchards after the rainy season. Look out for scale insects, and cyanide or spray for same when necessary.

Go over the trees carefully, and when there is dead wood or water sprouts remove them. If bark fungus is showing, paint the affected branches with the sulphur and lime wash. Clean up bananas, pineapples, and other fruits, as after the end of the month it is probable that there will not be any great rainfall, so that it is advisable to keep the ground well cultivated and free from weeds, so as to retain in the soil the moisture required for the trees' use during the winter months. Keep bananas netted; destroy guavas wherever found.

THE SOUTHERN AND CENTRAL TABLELANDS.

If the orchards and vineyards have not already been cleaned up, do so. Cultivate or plough the orchard, so as to get the surface soil into good tilth, so that it can absorb and retain any rain that falls, as, even though the trees will simply be hardening off their summer's growth of wood, it is not advisable to let the ground dry out. When citrus fruits are grown, attend to them in the manner recommended for the Southern Coast Districts; and when grown in the dry parts, keep the land in a state of good cultivation. Should the trees require it, a light watering may be given. Do not irrigate vines; let them ripen off their wood.

Farm and Garden Notes for April.

FIELD.—The wheat land should now be ready for sowing the early wheats, and that which has not been prepared should be ploughed without delay, April, May, and June at latest being the months for sowing. The main potato crop, planted in February and March, will now be ready for a first or second hilling up. The last of the maize crop will now have been got in. Where cotton is grown, the pods will now be opening, and advantage should be taken of dry weather to get on with the picking as quickly as possible. Picking should not be begun until the night dew has evaporated nor during rain. Sorghum seed will be ripe. Tobacco also will be ripening, and either the leaves or the whole plant harvested. Lucerne may be sown, as the growth of weeds has now slacked off, but the ground must be thoroughly prepared and cleaned. Sow oats, barley, rye, wheat, mangolds, and Swede turnips. Plant out paspalum roots. Seed wheat of whatever variety soever should be dipped in a solution of sulphate of copper (bluestone) in the proportion of 1 lb. of sulphate to 24 gallons of water. The seed may also be treated with hot water by plunging it in a bag into hot water at 120 degrees Fahr. for a minute or two, and then into water heated to 135 degrees Fahr. Allow it to remain in this for ten minutes, moving it about all the time. Then plunge the seed into cold water and spread out to dry. This plan is

useful in districts where bluestone may not be obtainable. Another safeguard against bunt, smut, black and red rust is to treat the seed with formalin at the rate of 1 lb. of formalin to 40 gallons of water. Schering's formalin costs about 2s. 10d. per lb., and is sold in bottles. It is colourless and poisonous, and should be kept where no children or persons ignorant of its nature can have a chance of obtaining it. To treat the seed, spread it on a wooden floor and sprinkle the solution over it, turning the grain over and over until the whole is thoroughly wetted. Then spread it out to dry, when it will be ready for sowing. Instead of sprinkling, dipping may be resorted to. A bushel or so of seed is placed in a bag and dipped in the solution. During five minutes the bag is plunged in and out, and then the seed is turned out to dry. Formalin is less injurious to the grain than bluestone, but, while the latter can be used over and over again, formalin becomes exhausted. It therefore follows that only the amount required for immediate use for sprinkling should be prepared. Do not sow wheat too thickly. Half a bushel to the acre is sufficient—more on poor land and less on rich soils. On light sandy soil the wheat should be rolled. On sticky land it should only be rolled when the land is dry, otherwise it will cake, and must be harrowed again after rolling. When the wheat is 6 in. high go over it with light harrows. If the autumn and winter should prove mild and the wheat should lodge, it should be kept in check by feeding it off with sheep.

KITCHEN GARDEN.—Hoe continually among the crops to keep them clean, and have beds well dug and manured, as recommended last month, for transplanting the various vegetables now coming on. Thin out all crops which are overcrowded. Divide and plant out pot-herbs, giving a little water if required till established. Sow broad beans, peas, onions, radish, mustard and cress, and all vegetable seeds generally except cucumbers, marrows, and pumpkins. Early celery should be earthed up in dry weather, taking care that no soil gets between the leaves. Transplant cauliflowers and cabbages, and keep on hand a supply of tobacco waste, preferably in the form of powder. A ring of this round the plants will effectually keep off slugs.

FLOWER GARDEN.—The operations this month will depend greatly on the weather. If wet, both planting and transplanting may be done at the same time. Camellias, gardenias, &c., may be removed with safety. Plant out all soft-wooded plants such as verbenas, petunias, penstemons, &c. Sow annuals, as carnations, pansy, mignonette, daisy, snapdragon, dianthus, stocks, candytuft, phlox, sweet peas, &c. Those already up must be pricked out into other beds or into their permanent positions. Growth just now will not be too luxuriant, and shrubs and creepers may be shortened back. Always dig the flower beds rough at first, then apply manure, dig it in, and after this get the soil into fine tilth. Land on which you wish to raise really fine flowers should have a dressing of bonedust lightly turned in. Wood ashes also form an excellent dressing for the garden soil. Prune out roses. These may be planted out now with perfect success. Take up dahlia roots, and plant bulbs as recommended for March. Layers that have made sufficient roots should now be gradually severed from the plant, and left for a fortnight before potting, to ripen the young roots.

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USE OF DYNAMITE IN HAWAII FOR DRAINAGE AND TREE-PLANTING.

From the Bulletin (No. 38) of the Hawaii Agricultural Experiment Station, Honolulu, we take the following paper by Mr. E. V. Wilcox, Special Agent in Charge, on "The Use of Dynamite in Farming":—

DIFFICULTIES IN DRAINAGE AND AERATION.

One of the chief problems in successful farming in Hawaii is the maintenance of the proper physical condition of the soil. Many soils are extremely heavy, being composed of fine clay and silt. Such soils are easily puddled and compacted, thus becoming relatively impervious to air and water.* While there is rarely, if ever, a true hardpan underneath the ordinary cultivated surface of Hawaiian soils, the soil beneath the depth to which cultivation is ordinarily practised soon becomes fully as hard and impervious as the hardpans which have given so much trouble in California, the Southern States, and other parts of the mainland. This sort of hardpan, which is really a mere compacting of the soil from the combined effects of moisture and pressure, is observed in a large proportion of the gardens and cultivated fields in Hawaii. No matter how deep the soil may be ploughed nor how thoroughly it may be harrowed or pulverised before planting, a layer of compact soil is soon formed just below the depth to which the cultivator may reach. This compacting

* Hawaii Press Bulletin, No. 29.

becomes more pronounced as time goes on until in fields upon which are grown such crops as pineapples the lower layers of the soil are altogether too firm for the best root growth or for the penetration of air or water long before the first crop reaches maturity. Since it is the ordinary custom to take one or two rattoon crops from the same field, the soil naturally becomes more and more unsuited to the best growth of the rattoon crops. It is a common matter of observation that while the upper two or more inches of soil may be perfectly pulverised by cultivation, that part of the soil which lies below is firmly packed into an impervious mass resembling vulcanised rubber or dried putty in consistency.

If soils of this character are carefully ploughed, the fresh layer exposed to the air may soon disintegrate into granules and may be well pulverised by cultivation, while the previously pulverised layer now lying underneath soon returns to a compacted condition. If heavy rains occur, the soil beneath takes on the puddled, impervious condition within a short time after ploughing and thorough cultivation. During the prevalence of long periods of drought, wide and deep cracks may form by the great shrinking of the colloidal matter in the soil. Cracks of this sort form to the depth of 4 ft. or more and sometimes to a width of 3 or 4 in. unless careful cultivation is practised. In soil which has become packed together into a solid mass, neither air nor water can penetrate deeply, or, at least, not rapidly enough for the purposes of plant growth. On this account great difficulty is experienced in irrigation. While the water-holding power of soils in Hawaii seems to be relatively high, yet the impervious nature of these soils when once compacted does not admit of the penetration of water at a rapid enough rate to prevent the excessive loss of irrigation water from the surface by evaporation. It, therefore, comes about that in times of heavy rain the surface of the soil is over-saturated with water, and superficial drainage must be provided to prevent erosion of the soil and also to prevent the exclusion of the air through over-saturation with water. Moreover, when drought occurs on the soils in question the rise of water from below takes place altogether too slowly to suit the demands of the plant, and crops therefore suffer from drought to an undue extent.

One of the most serious consequences of the unfavourable physical condition of such soils is the fact that the nitrogen in the soils becomes unavailable. Except where good conditions for aeration are brought about, the amount of nitrogen in the form of either ammonia or nitrate is decidedly small. In some Hawaiian soils the chemical state of iron salts becomes unfavourable where proper aeration is impossible. Another injurious effect of improper aeration consists in the deterioration of the physical structure of the soil with special reference to its lack of granules.

From numerous observations made on soils in different localities under different crops it is obvious that success in farming depends to a large extent upon the maintenance of proper conditions for aeration and drainage Otherwise, it seems impossible to hold the nitrogen in the soil in an available form or to bring about a suitable regulation of the water supply or distribution of air among the soil granules.

In attempts to overcome the troubles arising from the presence of a hardpan underneath the cultivated surface of Hawaiian soils various devices have been used. In some of the pineapple fields good results have followed the use of surface ditches, which carry off the surface water in times of excessive rain and thus prevent the soils from being packed together as firmly as would otherwise be the case. The cost of ordinary drain tiles, which have to be imported into Hawaii, is rather too great to allow their economic use on a large scale. There is apparently no clay in Hawaii which can be successfully used in making the ordinary red drain tiling. Recently some attention has been given to the use of cement tiles, and machinery for this purpose has been brought from the mainland. It is not yet known how expensive cement tiles will be. A few experiments have been made with fairly satisfactory results, using square redwood drains. Redwood will last at least for a number of years in the soil, and the expense for preparing such drains is lower than the use of clay drain tiles even near the factory where they are made.

USE OF DYNAMITE.

On account of the difficulties which have been experienced in bringing about a proper drainage and aeration of Hawaiian soils, the station has for a number of years carried on experiments in the use of dynamite. The holes for receiving sticks of dynamite cannot be drilled in our heavy soils by the use of an ordinary soil auger. In fact, even soil samples cannot be taken by this means in the heaviest soils. The best method of making holes for dynamite consists in driving an iron bar into the soil by means of a heavy hammer. The sticks of dynamite used for this purpose are 1¼ in. in diameter by 8 in. in length. The iron bar need, therefore, not be more than 1½ in. in diameter, and should be about 4 ft. in length. A 16-lb. hammer is sufficient to drive the bar to a depth of 2½ ft. with a few vigorous blows. The bar can then be removed by tapping a few times on the side to set it loose from the surrounding soil. It may then be drawn out, using some care not to allow loose soil to fall into the hole. It is not practical to make holes for dynamite in this manner in soils which are excessively dry, for the reason that too much loose earth will unavoidably fall into the hole when the bar is removed.

The proper distance apart at which the holes should be driven will depend somewhat on the nature of the land to be dynamited. In general it has been found that the cracks shattered in the soil by the dynamite explosion will meet across the space when the holes are driven 8 or 9 ft. apart both ways. In preparing orchard land for planting, the holes will naturally be made at such distances as it is desired to plant the trees. A few preliminary tests will determine whether a half stick is sufficient to shatter the soil or whether a whole stick will be required. When the holes are made 9 ft. apart, we have generally found it best to use a whole stick. The holes should be firmly tamped all the way from the stick of dynamite to the surface of the ground, since otherwise the explosion results in blowing a small quantity of soil high into the air and does not shatter the underlayers of the soil. If the holes are properly tamped, the force of the explosion is exercised almost entirely at a considerable

depth and shows little surface disturbance. Sometimes the surface layer of the soil is merely lifted a few feet immediately over the stick of dynamite, and when this result is brought about the best effect is obtained from the dynamite. If the bar is driven to a depth of 2½ ft. in heavy soils, the explosion commonly results in shattering cracks in ordinary soils to a depth of about 4 ft. and extending to about 5 ft. in all directions around the charge.

Where considerable areas are to be prepared with dynamite, the holes may be driven in rows 8 or 9 ft. apart in the row, extending across the field. The dynamite is then placed in position with cap and fuse attached so as to reach just above the surface of the ground. By means of a gasolene blast torch one man can touch off three or four rows of dynamite fuse and keep out of harm's way.

For tree-planting dynamite is confidently recommended as the best method of preparing the soil. Without the use of dynamite it is necessary to dig the hole at least 3 ft. in diameter and to a depth of 2 ft. In heavy soils this will require the labour of a man for about one hour. If the hole thus prepared is filled with loose soil and the tree planted in it, the tree may thrive for a year or two, but the roots soon meet with the smooth and compacted surfaces at the edge of the hole through which the roots have great difficulty in penetrating. The tree is, in fact, in about the same situation as if it had been planted in a large tub. Where dynamite is used, however, cracks are formed in the soil to greater depths than would be reached by hand digging and to a distance of 5 or sometimes 6 ft. on all sides, and the best conditions are thus furnished for the continued growth of the tree. The use of dynamite may, therefore, be recommended in planting papayas, avocadoes, mangoes, bananas, and other orchard fruits.

Little experience has been had in Hawaii in the use of dynamite for draining swampy places. In most localities where heavy rainfall occurs, the soil is underlain with loose porous rock to such an extent that almost no running or standing water is to be seen. In a few cases, however, where small swamps were formed, dynamite was used with beneficial results, the water disappearing through the deep cracks formed by the explosion.

For most purposes considered in this connection a low-grade dynamite is preferable to a high-grade powder. In the experiments at the station a 25 per cent dynamite especially designed for ploughing and soil preparation has been used. The explosion of this grade of dynamite is, of course, slower than that from higher grades, and the force of the explosion is much more largely used up in shattering the lower layers of soil. The brands of high-grade dynamite cause too much surface disturbance and do not produce so many nor so deep cracks in lower layers of the soil and sub-soil. As indicated above, when the low-grade dynamite is used and the holes properly tamped, there should be little disturbance on the surface and the clods of earth should not be thrown up more than a few feet.

According to the experiments carried on thus far, it appears that the cost of the dynamite, caps, fuse, and labour amounts to about 3 cents per hole. If holes are driven 8 x 8 ft. apart, the cost per acre will therefore be 20.40 dollars (£4 1s. 8d.); 9 x 9 ft., 16.10 dollars (£3 4s. 7d.); 10 x 10 ft., 13.05 dollars (£3 4s. 2d.); 20 x 20 ft., 3.25 dollars (13s. 6½d.). The last spacing named would be about the one used in planting orchard trees. In reference to the use of dynamite in farming operations, the phase "ploughing with dynamite" is frequently used. Even if the holes are driven not more than 8 ft. apart both ways, the soil is not actually ploughed, but is simply loosened to a depth far below that of ordinary ploughing. The ordinary ploughing and harrowing operations must, therefore, be performed in addition to dynamiting.

The use of dynamite in preparing the soil is to be considered as in the nature of a special treatment to provide for deep drainage at relatively long intervals. It is impossible to say how long the deep cracks shattered by dynamite will remain effective in Hawaiian soils. In various localities in the Southern States where dynamiting has been practised longest, it has been found that the effect of dynamiting persists for about ten years. If the cost of dynamiting does not exceed 25 dollars (£5) per acre, it will thus be seen that this special method of preparation is a profitable investment from the standpoint of the physical condition brought about in the soil and the consequent increase in crop yield.

The formation of deep cracks in the soil is beneficial in improving the drainage possibilities. More water can be held in the soil by reason of this additional depth of soil spaces, and the movement of water takes place more rapdly both downward during rains and upward in time of drought. In some cases an actual pocket is formed by the explosion of the stick of dynamite, while from this pocket numerous cracks radiate in various directions. So far as observations have been made, the beneficial effects from the use of dynamite are apparent in the growth of trees and other crops. As already stated, however, these observations have not been carried on for more than three or four years on Hawaiian soils.

SOIL MANAGEMENT.—III.

By G. B. BROOKS, Instructor in Agriculture.

Although it is apparent that successful crop production depends to a very large extent upon the early and thorough preparation of the land, still, the question as to what soil fertility really depends upon is not too easy of explanation.

We know that a plant must be supplied with certain substances by the soil before it will grow, and we also know that most of our soils contain sufficient of these ingredients to produce practically hundreds of crops. A very large proportion of these ingredients are, however, not in a condition suitable for the needs of the crop. The farmer has, therefore, to manipulate his soil in such a manner as to render these suitable.

They have to be what is generally termed "liberated"—or made available for the plant; and it is the farmer who best understands the composition of the soil and the needs of the crop who invariably makes a success of the calling.

It is also know that a plant cannot, like an animal, take in solid food with a drink to follow. The solid soil constituents have first to be rendered soluble by various agencies so that the feeding part of the plant can absorb them along with the necessary moisture. The dissolved matter, which has been termed "soil solution," is of the greatest importance to the farmer, for upon its presence the crop-producing power of the soil may be said to depend. It has generally been supposed that the richer the soil, the richer and stronger this soil solution. An investigator connected with an American soil bureau, after several years' research in this matter, has recently stated that this solution has practically the same strength or composition in every class of ordinary soil, and that to increase its fertility is not so much a question of supplying fertilisers as having the soil in a condition to absorb and retain moisture, and in such a fine state of division that the roots of the plant can get at every minute particle. Should this statement be correct, it means that fertility and the power of the soil to produce a full crop depend more upon its capacity to retain the proper amount of moisture than upon the actual plant food it contains.

The particles in a cubic foot of soil whose physical texture is good, is said to give approximately an acre surface. The aim of the farmer should be to so cultivate the soil that the whole of this surface is rendered available to the feeding rootlets of the plant, and also that this cultivation be carried out sufficiently early to allow of each of these soil grains or particles being surrounded by a thin film of moisture. Not only does this film of moisture act as a solvent on the ingredients it comes into contact with, but it also induces the growth of nitrifying organisms which assist greatly in the accumulation of nitrogen in the soil.

Different soils have naturally different capacities for holding moisture, according to the size of the soil particles and the manner in which they are grouped. Too great compactness and too open structure are not desirable: the former prevents the access of air and ventilation; the latter permits the water to pass down too rapidly, and the particles being large there is less surface to hold moisture.

It may be said that the finer and more friable the soil the more productive it will be, except in the case of excessive fineness. A soil with the latter characteristic will hold water so tenaciously as to render it too wet for cultivation.

The spaces between the soil particles are termed pores; and in a climate such as ours, where dry spells are frequent, it is important that the farmer should have a knowledge of the relationship existing between these and the conservation of moisture in the soil. It is by means of these pores that the moisture moves or gravitates, and in a dry time they pump the moisture from the subsoil to the surface. It will be found, moreover, that the finer the texture of the soil the quicker will the moisture be

pumped up. These pores bring the water to the surface, which, in a dry atmosphere, is evaporated at a very rapid rate; and the loss of moisture, even during the growth of a single crop, may amount to several hundred tons per acre.

In heavy black soils, such as are found on the Downs, this effect is very much in evidence. The soil is so retentive of water that it is impossible to do any cultivation for some time after heavy rain. The minute pores or tubes are, however, hard at work raising the moisture to the surface by what is known as capillary attraction, and they do their work so thoroughly that, unless action is taken to stop the flow by means of stirring the surface, thus breaking the pores or tubes, in a very short time the greater portion of the moisture is lost by evaporation.

The loss of moisture has the effect of causing the soil to shrink in many instances to such an extent that large fissures appear. The roots of the young plant are lacerated, and the crop, moreover, suffers from lack of moisture.

To successfully manage this class of soil requires a good deal of knowledge on the part of the cultivator. Not only is it difficult to work while either in a wet or dry state, but the conservation of moisture is also a problem that requires looking into, for we find that heavy black soils suffer to a greater extent from the effect of a dry spell than those of a lighter character.

The working of a soil whose particles are in a fine state of division—such as stiff clay—while wet, is very detrimental by destroying its granular condition. The particles adhere closely together, lessening, to a large extent, its moisture-holding capacity. This injury may affect the physical texture of a soil for years.

The problem of how we are to so improve or alter the texture or physical condition of these heavy soils, and make them more easily cultivated and better able to withstand a dry spell, is an interesting one.

Although clay is one of the most common substances known, yet what makes it so binding or plastic is by no means well known. Some investigators state that it is due to the form of the minute grains or particles that are in the shape of thin discs joined together like a net-work, and that, if worked up while wet, these discs are separated and made to lie flat on one another. Another theory put forth is that its plasticity or stickiness is due to the impurities of the water remaining in contact with it since it was transported, these impurities having been derived from the washing of forests—a sort of tannic acid. Moreover, it has been found that a weak solution of tannic acid will increase the plasticity of clay by some 300 per cent. It is said that the use of chopped straw by the Israelites in the manufacture of bricks was based on the tannic content of the straw increasing the plasticity of the brick. Apart from cultivation, two methods may be mentioned whereby a plastic soil may be made less sticky and more friable. One is, the addition of farmyard or green manure. On decaying, this vegetable matter provides carbon which surrounds the soil particles, preventing binding, and improving the mechanical condition very considerably.

Those farmers who have grown cowpea cannot but have noticed the beneficial effect it has on the condition of the soil and also the increased yield from subsequent crops. The application of farmyard manure to a crop, even as a top dressing, is generally the means of largely increasing the yield. A few years ago I supervised an experiment to test the effect of various methods of cultivation and manure on a two-year-old lucerne crop. The result of these tests showed that a top dressing of 15 tons of stable-yard manure per acre just doubled the yield. Yet this increase cannot be set down as a result of the additional plant food supplied, but of the mechanical or physical effect it had on the soil. It was found, when the various portions were being spring-tooth harrowed, a few months after the manures were applied, that the soil on the area top-dressed with stable manure was much more loose and friable, a fine deep surface mulch being the result.

Another means of improving sticky soils and one largely availed of in other agricultural countries is by liming. Lime acts beneficially on the soil in several directions. It breaks up organic matter, thus liberating nitrogen and other valuable plant foods, and, at the same time, forming carbonates which, surrounding the soil particles, render it much more friable. The presence of lime has also a very beneficial effect on the growth of nitrifying organisms, and in some wet soils a heavy dressing of lime is as good as a system of tile drainage.

I have not the slightest hesitation in saying that at some future date lime will play a most important part in the operations of the Queensland farmer, more especially in connection with our heavy black soils.

The application of quick lime to soils deficient in vegetable matter is not, however, recommended unless followed up by a system of green-manuring or heavy dressings of stable manure. It can, however, be applied in the ground form, or as lime screenings, without any detrimental effect.

[TO BE CONTINUED.]

HINTS TO NEW SETTLERS—No. 4.

BY THE EDITOR.

FENCING.

The settler on open downs country and on treeless plains cannot fence his land with posts and rails as cheaply or as expeditiously as the man on or near timbered country. He must, therefore, enclose his paddocks with wire fencing, which I will deal with later on. The splitting of posts and rails has already been described, and it only needs to be added that posts should be thicker and heavier than rails—that is, from 2½ to 3 in. thick and 7 ft. long. In the good old days, when splitting timber was plentiful, it was considered necessary to erect three-rail fences for protection against calves, cunning old cows, and kangaroos. A two-rail fence was rarely erected, and where there was a

two-rail I have seen a mob of kangaroos pop through without any difficulty not many miles from Ipswich. In putting up a three-rail fence, the broadest and heaviest rail was always the middle one, the top one being the lightest of the three. Such a fence was rather top-heavy, and liable to be blown over after continuous soaking rains or pushed over by cattle and horses, unless the posts were deeply set in the ground and thoroughly well rammed. The erection of a fence by contract was not always satisfactory, as unscrupulous fencers have been known to "sink the post-holes with a cross-cut saw," which means that, to save sinking the holes in stiff ground with a bar and shovel, the fencer, to save labour, sank them 6 in. too shallow, and to equalise matters sawed off 6 in. of the post. I have described the "met" rail. These were often put in where there was no supervision; and as the strength of a chain lies in its weakest link, in like manner the strength of the fence lay in the met rails. Post-holes for corner posts should be not less than 3 ft. deep, and for all intermediate posts 2 ft. is sufficient in good holding ground. Corner posts should be of solid round timber at least 1 ft. in diameter.

As previously stated, the length for rails is 9 ft. The posts will be 8 ft. apart, which allows for the tenon at each end of the rail of 6 in. Sometimes a sapling cap is placed on the top of the posts as a precaution against animals given to jumping. This gives a height over ground of over 5 ft., which few animals will attempt to jump. The number of posts required per mile at 8 ft.—really 9 ft.—distances is 588, and the number of rails 1,174. I am now dealing only with two-rail fences, the more expensive three-rail being out of date. At 12 ft. apart there would be 440 posts, but these numbers must not be taken as fixed, since gullies and other obstructions may necessitate short and long panels. Where palings are required to keep out wallabies and other marsupials, it is customary to reckon 20 palings to the panel of 8 or 9 ft., but broad palings will generally run to 16 or 17 per panel. Taking the larger number, 11,760 will be required per mile.

MORTISING POSTS.

I now come to the preparation of the posts and rails for erection, presuming that posts and rails have been drawn on to the line.

The usual implement for mortising the holes in the post is the mortising axe, a very unhandy tool for a novice, but excellent in the hands of an expert. How many holes can a man mortise in a day? In the case of three holes per post, my experience is that he can do 90. I may incidentally mention that many years ago, when I was engaged in putting up a three-rail fence, I mortised 40 posts in one day, but that was not a regular thing. Much depends on the timber and on the dryness of it. A man will mortise three holes in a green bloodwood post while the other fellow is getting through two in a dry ironbark post.

The hole to receive the rail is usually about 5 in. long and 2 or 2½ in. wide, and the work is done thus:—

Lay the post on a couple of logs so as to avoid too much stooping. Make a straight cut at what will be the top of the hole, and then cut slanting towards it to take out a chip. Go on in the same way until you

are more than half-way through the post. Then do the same with the lower part of the intended hole. If this is the hole for the lower rail, you may now fearlessly cut out the chip between the two holes by side cuts; but if it is the top hole, you must be careful not to drive the mortising axe in too deep or straight. If you do ten chances to one that with a free-running post you will split it, and that post will be only useful to boil the billy. When the two holes have been carefully chopped out to length and width on one side, turn the post over and proceed in the same manner and still more cautiously with the top hole. When both are through, then dress them evenly, and they are ready to receive the rails. The corner post is mortised by boring two or three holes with a 2-in. auger, and chiselling out the wood between them.

Now we come to dressing the rail. This is done sometimes roughly with the axe, but the proper way is to use the saw to reduce the end of the rail to the length of the hole in the post. Then the adze comes into play, and you adze the end down to about 1 in. or a little more, according to the size of the post-hole. Say that is a little over 2 in., two rail-ends have to occupy it side by side, so the rail-ends must be so trimmed that they will easily fit the hole and yet be quite tight when driven up with a maul or axe-head. It may be that some of the rails are windy—that is, that when lying flat on the ground one part of one end will be cocked up to the right, and the opposite part of the other end to the left. This can easily be remedied by adzing down the cocked-up parts, so that the ends are levelled and will fit into the post-hole almost as well as if they were straight. Say you are starting from your corner post. Set your next post in the hole in the ground, put the ends of the rails into the mortise hole in the corner post, and raise the other ends, inserting them into the holes in the second post. Then use the maul or axe and drive them home into the corner post. That is your first panel. Ram the second post tightly, remembering that 1 in. of ramming at the bottom is worth 6 in. at the top.

I should have mentioned that before starting to erect the fence or dig holes the line should be marked out by stakes with a piece of paper on the top of each, so that the line of holes and posts may be quite straight. Now you go on in the same manner until you arrive at the far corner. Here you do not set up your corner post until you have rammed your last split post—in fact, it is better not to ram the latter until the last two rails have been fitted into it and the corner post. When both are quite in line, and upright, then ram.

If you do not make gates, you must have slip-rails; and where the entrance is, there must be two posts like corner posts. One of these is mortised in the ordinary way for corner posts, but the other has to be mortised in such a manner that the slip-rails (which should be of stout round timber) may be easily slipped out and in. To effect this, make two ordinary mortise holes in the post, and then cut out a slanting slot in the post (not as deep as the mortise hole) to meet the latter. The rail-end is dressed to a thickness of about 2 in., and is shorter than the distance between the ends of the two opposite holes in the posts. Now you can insert one end of the rail into one post, and slip the other end

down the slot where it meets the mortise. Then move the rail till it reaches the bottom of the mortise. Do the same with the other, and your entrance is secure against any but very cunning animals. To circumvent these, a sapling driven into the ground at the slot end is effective. Some fix an iron bar over the slot end, and a bit of fencing wire attached to each rail will afford protection against their being lifted out.

MAKESHIFT FENCES.

There are two or three makeshift fences which have been in times past used by settlers, such as log-fencing, snake-fencing, fork and sapling; but these all have the disadvantage of being liable to destruction by bush fires, and are more trouble than they are worth. In dense scrubs, wire has been used fastened to scrub trees, but such a fence is constantly being damaged by falling trees and limbs. Paling and wire fencing will be my next subject.

[TO BE CONTINUED.]

EXPLOSIVES IN AGRICULTURE.

A demonstration of the usefulness of explosives for removing trees and stumps, ditching, and subsoiling was given at Mount Barker recently. The test was reported in the "Advertiser" (S.A.) as follows:—The first stump chosen was a pine of about 30 years' growth. Evidently the soil and climate are eminently suited for the growing of pines, for this stump, 2 ft. above the ground, was 10 ft. in circumference. A hole was bored in the ground towards the tap root with a 2-in. auger, and 30 plugs of gelignite were inserted and fired. This was repeated on the other side of the stump, and, although the earth was removed from underneath, the tentacle-like roots still held the stump in place. These roots, which ran almost horizontally from the stump, were then operated on. With a 1-in. auger a hole was bored into each root, and one plug of gelignite was placed in each hole; then all were simultaneously fired. Upon examination every root was found to be completely severed, leaving the stump ready to be hauled. The next stump was about the same size, but the experience gained in the first saved money in the second. In this case the operations were reversed, the tentacles were cut by gelignite, then three holes under the stumps were charged and fired simultaneously. Spectacularly and financially the effect was grand. One portion of the stump weighing over 2 cwt. was blown at least 50 ft. into the air and fell 120 ft. from the place of explosion, the rest of the stump being removed many feet. The unbelievers were completely won over by the signal success of this experiment. The whole cost for gelignite, fuse, detonators, and time was as near as possible 7s. The general opinion among the onlookers was that the stumps would have taken one man one and a-half days to grub. A blackwood tree, 25 ft. high and 50 in. in circumference, was blown out of the ground, after about ten minutes' work, at a total cost of 2s. The effect was then shown on growing red gum trees, ranging

from 45 ft. to 63 ft. in height and from 4 ft. 6 in. to 7 ft. 6 in. in circumference. It was surprising how quickly, simply, and cheaply these trees were taken out. The preparations for the largest of these gums took only ten minutes, and at a cost of 3s. the job was done. The smaller trees took about the same time for preparation, but the cost in each case was lessened by 6d. to 9d. per tree.

For ditching, dam-sinking, and general excavation work, explosives must in the near future be very greatly used. The holes for the ditching experiment were prepared by novices, but were not properly placed. The proper position is zig-zag fashion, the holes to be 2 ft. apart in a straight line. A plug of gelignite was inserted in each hole and fired. The explosions caused the ground to fly, and as a result all along the line of fire it was broken up to a depth of 3 ft. or more, making the removal of the loosened earth a matter of simplicity. For subsoiling proper, a new powder of Australian manufacture was used. This was fired by means of a primer in the shape of a third of a plug of gelignite with the detonator. The holes were bored 2 ft. deep and 10 ft. apart, and the charge inserted and fired. Little result was apparent on the surface (except in the case of one hole, where a double charge was placed for experiments), but below the ground was broken in all directions, the cracks extending from one hole to the other. At the actual spot of the explosion a spade could be driven down to the handle. For those who contemplate planting trees of any kind, roses or shrubs, preparation of this nature is advised for three reasons—viz., time saved, money saved, and the roots of trees or shrubs get no check in their growth.—" Garden and Field."

WATER SUPPLY TO FARMS.

(CONTINUED FROM FEBRUARY ISSUE.)

BY ARTHUR MORRY, Surveyor, Department of Agriculture and Stock.

SPRINGS AND SUBTERRANEAN SUPPLIES.

Some springs found near the seashore are no doubt affected by infiltration from the sea, and bores and wells in such cases will contain water more or less brackish, unless they should happen to intercept an underground stream of fresh water on its way to the ocean under pressure from higher levels.

Until comparatively recent years no decisive proof could be given to settle and determine the theory that springs occurring inland are supplied by rain, dew, &c., which are originally raised from the ocean by evaporation. Science has of late years, however, so far advanced that we can now recognise the cause and the means of the exhaustion and replenishment of subterranean reservoirs. The use of this term, however, should not be taken to mean that the surface of underground waters is level like that of a lake. These reservoirs being formed by the saturation of large areas of sand, gravel, and porous rock, the surface always has a fall towards the outlet, and if there are several outlets in different directions, as is frequently the case, the water surface will

then form a low swelling hill, from the top of which it would flow, having the appearance of an inclined plane in either direction. As is well known, fresh water, free from contamination of any kind, may often be found on the seashore, above or below high water mark, coming, it may be, from great distances and often from mountain sources, finding its way beneath the impervious strata by which it is superimposed.

As these articles are written for farmers, who cannot be expected to have an intimate knowledge of geology, it is not necessary to describe the order and arrangement of the geological strata forming the crust of the earth, nor to explain the properties of the various substances of which that crust is composed. It is quite sufficient for our purpose to state the relation of these substances composing the earth's crust, as connected with springs and underground supplies. It is known that vegetable soil, if it rests on gravel or sand, will always be dry, because the substratum drains away all the surplus moisture out of the soil; but if that vegetable soil rests on clay or solid rock, and there is no way by which the surplus water can escape, then the soil speedily becomes waterlogged, forming a quagmire or swamp. In such positions as these springs are frequently found quite near the surface.

When water is found in abundance in a bed of gravel or sand near the surface, it may be taken as a certain indication of the presence of clay or rock or some other impervious substance immediately below it. It often happens that gravel or sand rests on a porous rock, and in such cases it is hopeless to expect water until that rock is penetrated to the point of saturation. Sometimes, also, a bed of water-bearing sand or gravel lying at a considerable depth is covered by stiff clay, and this must be penetrated, no matter what the thickness may be, before a supply can be obtained.

In almost every part of the world, not excepting our own country of Australia, some remarkable circumstances have occurred affecting the discovery and supply of water to springs, which would be interesting reading, but practical farmers are more concerned with the practical side of the question. These illustrations are therefore omitted, and consideration given to some natural indications which may lead to the discovery of springs and underground supplies where nothing would appear, to those unaccustomed to observing natural phenomena, to induce a belief in their existence. It is well known among persons accustomed to country life that if the grass assumes a brighter tinge in one particular part of the paddock, or if the ploughed ground appears to be much darker in one part than another, it is very likely that water would be found at a shallow depth; or, again, if insects are seen in great numbers hovering over a particular spot, not far from the ground, especially in the evening, it may indicate the presence of a concealed spring. In some parts, particularly so in Northern Italy, well sinkers are in the habit of going in the early morning to the localities where they desire to sink a well, and lying down with their faces to the sun they endeavour to discover the places where dense vapours arise from the ground, in the belief that where those vapours appear more dense it is owing to the existence of subterranean springs.

In Australia certain trees are known to indicate the presence of water, as growth would be entirely prevented and the tree soon die unless the roots could be nourished constantly by underground water. The foliage, colour, and healthy appearance generally, when compared with other trees in the absence of this root nutrition, generally conveys a meaning, understood by those who study the subject. There are also certain bushes which are known to grow only where they can obtain moisture. Their long tap roots extend for a considerable distance until they reach the stored-up supply; swallows sometimes by their flight near the ground, in search of insects which hover over damp spots, especially during dry seasons, also give a useful indication; and water is generally to be found in more or less quantity where these indications occur. The underground supplies to which these natural phenomena apply are of necessity near to the surface, though deeper sources of supply may exist in the same spots which require different methods to discover them.

Springs are not found, as a rule, at the head of valleys, but very often at the intersection of secondary valleys with the principal one, and lower down still, where the least water is apparent on the surface. It is somewhat remarkable that streams flowing through valleys which are nearly at right angles with the river or larger streams into which they flow, yield a much smaller supply than those which flow at a greater angle. The reason of this is difficult to explain, but the same law holds good for subterranean streams, and it may therefore be considered that the most likely place to find water would be at a point where long transverse valleys or gullies join the principal one. The belief in the general principle that subterranean waters follow similar laws to those on the surface is correct, unless it be that the sources of supply extend to greater depths, when other considerations operate.

The selection of a site for a well or bore is of such importance to the farmer that unless he has thorough confidence in himself he should not hesitate to seek expert assistance; but very often even that advice is unreliable. It has often been the case that eminent geologists have been deceived in the application of their known geological laws, and quite frequently when they have stated that water would not and could not be found in such strata they have been proved to be wrong. Underground water does not exist by chance; it must owe its presence to definite geological conditions; therefore the mistakes frequently made by geologists are more difficult to understand, and can only be accounted for by the presence of faults at great depths, as previously referred to, and narrow subterranean overflows in the direction of their outlets, through disturbed strata of which there are no surface indications.

There are yet, however, some simple surface geological indications which may go far to guide the intelligent farmer in his search, and which may help him to reason out his problem.

[TO BE CONTINUED.]

Pastoral.

SOJA BEAN FOR FATTENING LAMBS.

Several articles on the value of the soja bean have been published in this journal and in July, 1912, an excellent dissertation on the cultivation, harvesting, and uses of the bean appeared. In this article it was stated that the soja bean constitutes good food for swine. Now we have from a bulletin of the Wisconsin Agricultural Experiment Station that the experts there have tested the value of soja-bean seed for fattening lambs. In one experiment two lots of ten lambs each were fed the same roughage. One lot received shelled corn and whole soja beans in equal proportions, while the other received the same quantities of shelled corn and whole oats. The average gain of each lamb during a period of twelve weeks was 16.3 lb. when soja beans constituted a part of the ration, and but 13.7 lb. when oats were used. A pound of gain was produced on 6.11 lb. of grain and 7.11 lb. of roughage in the soy-bean ration, while 7.28 lb. of grain and 8.62 lb. of roughage were required on the oats ration.

THE FARMER'S SHEEP.

By W. G. BROWN, Sheep and Wool Expert.

FENCING.

An important (an essential, indeed) matter in mixed sheep farming, and one which amply repays initial cost, is the making of every fence on the farm sheep-proof. With Merinos that is not difficult, the ordinary six or seven wire fence being quite sufficient. As the farmer must deal with the British breeds and their crosses, however, he will have to consider other than wire fences, for these last-named animals are great wanderers and very much more enterprising than Merinos. Wherever a Lincoln or Leicester, for instance, can find a place for head and shoulders, he will, sooner or later, thrust his body, and escape from the paddock, taking with him the rest of the flock with which he has been running. The neighbours will not like, say, 200 or 300 hungry sheep in their crops. There is a big chance of losses, too, should the breach be in a fence running along a main (or other) road. Dogs, travelling sheep, &c., are often to be seen on these roads, and these are very likely to find stray sheep.

Netting may be placed on existing fences at from £17 10s. per mile up to £29 15s. This last is 1¼-in. rabbit netting. Such is not necessary;

27-in. netting, 3-in. by 15 gauge, is quite good enough if posts on boundary fences are strong. A good new fence, netted for sheep, will cost anything from £40 up to £73. A very good and effective fence may be erected at about £55 on the Downs. For subdivisions, the cheaper fence would be quite good enough.

While on the subject of fences, another important point in successful sheep farming is division and subdivision of paddocks. A 10-acre paddock is not too small. It is certain that a paddock of 100 acres will give poorer returns than four paddocks of 25 acres each. The advantages and disadvantages of small paddocks as compared with large may be put thus:—

The advantages are—Total consumption of all herbage, which may include even Bathurst burr if not too old, and less likelihood of the feed being trodden down and soured if sheep are run in small paddocks.

Sheep may be changed oftener, and they are very fond of a change of pasture, if the new one be bare. Fodder is allowed in larger paddocks to grow too long and rank. The sharp toes destroy more than is eaten if the sheep are left too long in a fallow, as must happen in a big paddock.

In small paddocks sheep become quieter, and consequently do better.

The one disadvantage is—Extra outlay in fencing. These fences need not be permanent. A light netting fence, on temporary posts,* will be pretty efficient in confining the animals until the subdivision becomes bare. If temporary fences be used, they may be removed when the whole area is to be ploughed. These remarks *re* small paddocks apply equally to lucerne and to the growth of herbage in fallows. The water difficulty need not trouble the farmer if the herbage be green. I have known sheep in the autumn and spring months to be weeks without water, if on green feed.

The time is rapidly aproaching in Queensland when intense cultivation will take the place of present methods. The rapidly increasing values of Downs lands especially will, as in all other countries, bring that state of things about. When values have risen to somewhere near those of, say, Victoria, intense cultivation will be the only getout. With intense cultivation must come very much smaller paddocks than now obtain, and farmers will double their returns on areas which now do not give, in a series of years, much more than a living.

Good crossbred-proof fences and small paddocks—say 25 acres each —give a sheep farmer on comparatively small areas a really good chance of handling his country to the best advantage. His sheep will be quieter; his fallows kept bare; and he will have feed when his neighbour, who has only large paddocks for his stock, is bare of forage.

* The old-time "rolling fence."—Ed. "Q.A.J."

Dairying.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

MILKING RECORDS OF COWS FOR MONTH OF FEBRUARY, 1913.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Test.	Commercial Butter.	Remarks.
			Lb.	%	Lb.	
Madame Melba	Holstein	2 Jan., 1913	1,063	4·4	52·51	
Lark ...	Ayrshire	22 Jan. ,,	770	4·8	42·20	
Rosalie ...	,, ...	5 Aug., 1912	603	5·3	37·53	
Bluebelle ...	Jersey	2 Aug. ,,	523	5·8	35·80	
Glen ...	Shorthorn... ...	5 Sept. ,,	659	4·8	35·65	
Miss Lark ...	Ayrshire	12 Dec. ,,	625	4·8	33·82	
Miss Melba	Holstein	22 Jan., 1913	951	3·1	32·43	
Miss Edition	Jersey	13 Aug., 1912	479	5·6	31·51	
Lady Loch...	Ayrshire	10 July ,,	638	4·3	30·81	
Lavinia's Pride	,, ...	2 Feb., 1913	686	3·8	29·04	
Pauline ...	Shorthorn... ...	7 Dec. 1912	685	3·7	28·19	
Burton's Lily	,, ...	5 Oct. ,,	401	6·0	28·40	
Auntie ...	Ayrshire	4 July ,,	424	5·6	27·88	
Bella ...	,, ...	4 Dec. ,,	582	4·2	27·37	
Silver Nell ...	Shorthorn... ...	29 Oct. ,,	596	4·0	26·63	
Sweet Meadows	Jersey	3 Sept. ,,	382	5·3	23·73	
Flora XVII.	,, ...	10 Feb. ,,	329	6·0	23·18	
Burton's Lady	Shorthorn... ...	5 Oct. ,,	410	4·9	22·66	
Lonesome ...	Ayrshire	13 Dec. ,,	609	3·3	22·20	
Lass ...	,, ...	30 Nov. ,,	620	3·2	21·87	
Gem ...	Shorthorn... ...	29 April ,,	342	5·4	21·68	

DO PIGS PAY?

According to the following report which appeared in the "Brisbane Courier" last month, it would appear that these animals pay handsomely; and we have always maintained that farmers do not pay sufficient attention to breeding stock for which there is a constant and increasing demand by the local bacon factories. The Crow's Nest correspondent of the "Courier" wrote:—

"The credit slips received by Mr. F. Gersekowski, of this district, for pigs sold during 1911, when totalled, amounted to £412. This seems a nice sum to come from one branch of a general farm, but Mr. Gersekowski was not satisfied with this, and during 1912 his income from pigs was £672. He breeds all his own pigs, and gets all the profit. Besides the above, Mr. Gersekowski has a large herd of dairy cows, milked by machines, is a heavy cream supplier, and sells the average amount of produce annually. This is done on 320 acres."

FEEDING CATTLE ON PRICKLY PEAR.

The "Madras Times" states that the Bombay Agricultural Department have investigated the experiments made last spring by an Englishman at Dhond, named Norton, in feeding cattle on prickly pear. Professor Knight, of the department, reports on its working, and says that milch cattle were kept for a long period in a condition of more than average excellence on fodder consisting entirely of prickly pear with thorns singed off, with 60 lb. of cotton seed to 1,000 lb. of pear. The pear is put through the chaffcutter, and cotton-seed oil is added to counteract any irritative effect caused by it.

HINTS TO DAIRY FARMERS.

"A little nonsense now and then is relished by the wisest men." The following bit of nonsense appeared in an exchange lately:—

HINTS TO DAIRY FARMERS.

See that cows are kept dry, and that plenty of warm straw is strewn round their roosts. Do not allow cows to roost on the fences; it gives them rusty feet and damages the wires. Stop cows from drinking water; it might mix with the milk, and there is a heavy penalty. Keep the animals from browsing round churches, because they are likely to get dry bible. Do not allow them to eat more green grass than they can; it turns the butter green. If the butter turns green, paint it a pale-yellow, or it will not sell. Now is the time to make cheese. A poly cow is the best for cheese. If you want lively cheese, however, exchange the poly cow for a Jersey Shorthorn, even if you have to give something to boot. Separate all cowlets from the cows, as they drink all the milk. Cowlets should be earning their own living. Just now all milk should be scalded to 101½ degrees Fahr. Test it with a finger. Do not allow tick in cows or customers. For good results buy high-priced stock. You can't get rich milk from a poor cow. It is dangerous to take the hide off a cow more than once a year.

GEOMETRICAL INSTINCT OF BEES.

The late Mr. W. B. Tegetmeier, who died in November last, was one of Darwin's most valuable coadjutors when the latter was making the researches which were afterwards given to the world in "The Variations of Animals and Plants under Domestication," the "Origin of Species," the "Descent of Man," and other epoch-making works; and in many of his volumes Darwin acknowledged the assistance rendered to him by his fellow naturalist. He once tried an experiment by which a bee was led to build a single cell, and found, as he had suspected, that the geometrical instinct of the bee was a myth. The cell, in fact, was circular, and he read a paper on this discovery at the British Association meeting in 1858.

The Horse.

ARMY REMOUNTS IN GREAT BRITAIN.

It has been proposed by the War Office that the British Government offer horse-breeders, farmers, &c., a subsidy of £4 per annum for a period of three years, under certain conditions, to provide for replacing casualties amongst the various classes of army horses. On this matter, the "Live Stock Journal" says:—

At the annual conference of the National Union of Horse and Vehicle Owners, Mr. Thomas Hawkins, the secretary, in a paper on "Army and Territorial Horses," claimed that on a general mobilisation the regular army at home required about 44,000 horses to fill up its ranks to war strength, and it was estimated that the territorial force would require another 86,000, and then beyond that there would be a continuous demand for more horses to replace casualties. He agreed that the proposed subsidy of £4 per horse per annum, mentioned in the "Live Stock Journal" last week, would be a good thing. It would enable owners to retain, for the conduct of their business, horses suitable for mobilisation purposes, and would materially benefit the Government in that it would enable them to mobilise the requisite number of horses for cavalry and transport service. He condemned the recently introduced scheme for purchasing and boarding-out horses for the purposes of the territorial force.

Judging from the statement made at this conference by Major G. F. MacMunn, the Government scheme is one of paying a £4 subsidy per year to anyone who would offer the War Office horses of the artillery type, and of necessity horses in hard work and up to hard pulling. The War Office stipulate for a three-years' agreement, for their time is but wasted in having a horse on their books for a year and then to be struck off. Certainly the £12 spread over three years looks a better proposition and a more profitable return to the owner of the right horse than a solitary £4. The owners of suitable horses can always break the contract at any time, provided part of the subsidy received be refunded. The Government ask nothing from the owners in time of peace, but in war time they would want the horse within forty-eight hours' notice, and at a price which would be agreed upon between the parties and the Government. A penalty of £50 would be imposed for each horse not produced in a fit condition at the time of mobilisation.

In view of the falling off in the number of horses of the 'bus-pulling type, the War Office have thus agreed, and not too soon, that it is high time the Government came to the assistance of that phase of the horse industry, as much for the country's protection as for that of the horse-owners. In London alone 25,000 'bus horses have gone off the streets

owing to the advent of motor traffic, which will, if it increases at its present rate, throttle itself as an industry by sheer overcrowding of the streets with motor vehicles. Thanks to a series of " blocks" in the traffic, caused by the presence of unending motor-'buses, it now takes quite as long to travel per motor-'bus from Chancery lane to the Bank as it did in the days of the old horse-drawn 'bus.

This £4 step taken by the War Office is quite one in the right direction. It will encourage owners of horses of the 'bus-horse and artillery type to keep them, rather than to sell out on the least provocation. Because those 25,000 horses have gone off the streets of London, it does not signify that they are entirely lost to the country. They have found new spheres of usefulness as modern heavy vanners, and are fulfilling their destinies even on the farm. England is certainly not short of horses of the type the army wants.

Week by week, at the horse sales in our leading repositories in Wrexham, Crewe, Peterborough, Leicester, York, and in the Metropolis, horses are being bought and sold and distributed over the land of quite the right type for army haulage purposes. This £4 scheme, small as the sum may look and hence not very attractive, only requires to be known to immediately attract the attention of the possessors of such horses. Spread over a number of years as a business proposition, the return is quite a good one in these days when motors depreciate so quickly as to be hard to sell for scrap-iron at the end of four years' wear and tear. But the thew and muscle of the 'bus horse is with us, like the railway sandwich, an ever-present reminder that time withers not, neither does custom stale, the infinite variety of the vanner, the modern term for the heavy-light-weight army haulage horse.

If the Government and the War Office would follow up this £4 subsidy by either paying a better price for cavalry horses, or by taking them at an earlier age, as has been so often advocated in these columns, then they would be doing something towards helping horse-breeding and supplying the wants of the army as well.

The chief thing to do is to subsidise; and if the War Office would do this in the way of subsidising mares, it would follow that the breeder would keep his mares. He would, surely, then begin to think if it would not be worth his while to also breed from them.

IMPROVED PRICES FOR ARROWROOT.

A parcel of 5 tons of arrowroot was sold in Brisbane in the first week in March for export to Melbourne at £21 10s. per ton net f.o.b. The " Courier" understands that it was bought on behalf of manufacturing confectioners, who have a special use for Queensland and South Sea Island arrowroot, which the West Indian article does not fill. Generally there is a firmer tendency with regard to Queensland arrowroot, and growers should obtain better prices shortly.

Poultry.

REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, FEBRUARY, 1913.

Three thousand one hundred and forty-seven eggs were laid during the month. Several of the pens are now in heavy moult, the following being the owners of those affected:—Messrs. Gosley, Cornish, Holtorf, Cowan Bros., Hay, Smith (No. 2). A *post-mortem* examination was made in the case of Mr. Dalrymple's hens (mentioned in last month's report) by Government Veterinary Surgeon McGown, with the result that No. 24 was found to be totally barren, and had no sign of ovaries; at the orifice of the oviduct, there was a fibrous growth which would prevent the passage of an egg; hen No. 25 had about a dozen immature ova, about the size of pins' heads. Both hens were packed with fat, the abdomen being quite hard. Mr. McGown was of the opinion that neither had ever laid an egg. One hen of Cowan Bros. and one of J. Gosley's died during the month, and were replaced by reserve birds. Mr. Zahl wins the monthly prize with 136 eggs. The following are the individual records:—

Competitors.	Breed.	Feb.	Total.
R. Burns	Black Orpingtons	127	1,428
T. Fanning	White Leghorns	117	1,370
J. R. Wilson	Do.	130	1,322
A. T. Coomber	Do.	107	1,318
E. A. Smith	Do. (No. 2)	119	1,312
H. Tappenden	Do.	115	1,308
Range Poultry Farm	Do. (No. 1)	119	1,305
J. Gosley	Do.	80	1,238
Mrs. Sprengel	Do.	113	1,221
Yangarella Poultry Farm	Do.	95	1,220
A. R. Wooley	Do.	83	1,209
R. Burns	Silver-laced Wyandottes	117	1,205
Mrs. Beiber	Brown Leghorns	110	1,200
J. Zahl	White Leghorns (No. 1)	136	1,177
E. A. Smith	Do. (No. 1)	110	1,168
W. D. Bradburne, N.S.W.	Do.	74	1,159
B. Holtorf	Do.	89	1,151
A. H. Padman, S.A.	Do.	121	1,150
Cowan Bros., N.S.W.	Do.	88	1,148
Range Poultry Farm	Do. (No. 2)	121	1,138
H. Hammill, N.S.W.	Do.	112	1,102
J. Holmes	Do.	91	1,095
Mrs. Craig	Do.	116	1,091
J. Zahl	Do. (No. 2)	106	1,088
D. Grant	Do.	113	1,065
F. W. Cornish	Do.	93	1,052
R. Burns	Do.	89	991
Mrs. Dredge	Do.	99	987
J. F. Dalrymple, N.S.W.	Do.	102	983
W. W. Hay	Black Leghorns	55	954
Totals	...	3,147	35,155

FOWL TICKS.

A number of ticks discovered on fowls at Dalby have been forwarded to the department by one of the stock inspectors, who states that 40 to 50 deaths have occurred in the district, on properties some distance apart, apparently owing to this insect. The insects were submitted to Mr. E. Jarvis, Assistant Government Entomologist, who reports and recommends as follows:—

The fowl ticks forwarded from Dalby by Inspector Reid belong to the genus *Argas,* the species of which are nocturnal parasites of various birds, &c., and often prove very troublesome to poultry breeders.

The eggs of this pest are said to be laid in cracks and crevices, and when hatched the young ticks—which at this stage are not unlike mites—crawl under the wings of the fowls for a few days until the first moult, when they assume the ordinary tick shape and drop off. These pests hide by day like bed bugs, and feed only at night; and it has been stated that they can live absolutely without food for nearly two years, and are able after so long a fast to again infest a flock.

It is important to notice that a weakened condition of fowls—the first symptoms of which are dullness of plumage, leg weakness, or diarrhœa—may be entirely attributable to the unsuspected presence of this blood-thirsty tick.

" The fowls mope about " (says an able writer), " drooping and listless, with their combs and wattles becoming light-coloured. Finally, they become weak on their legs, dropping off their perches, and at this stage soon die. Old fowls that recover are lame, and run with a curious hopping motion for some time after they have recovered from the disease. We now know for a fact what was previously suspected—that tick affects poultry in two different ways, just as the Queensland cattle tick affects stock. In the first instance, simply being bloodsuckers, like bugs, they swarm in a hen-house, and reduce the healthy condition of the birds by ' tick worry,' loss of rest, and loss of blood. When, however, the fowls begin to die off, the disease is a much more serious thing to contend with, for the fowl ticks infesting the poultry yard are themselves infested with a parasite which they pass on into the blood of the fowl, where it becomes a blood parasite, and the micro-organisms multiply with such marvellous rapidity that in most cases the ' fever ' causes the death of the bird."*

This disease is now known as *Sphirochæta marchouxi,* and it is interesting to be able to mention that Dr. Dodd (late of the Queensland Agricultural Department), who has studied the malady in Australia, says that " in one instance a fowl who was bitten by ticks that had fasted for seven months and six days died with symptoms of chronic spirochetosis."

The fowl tick is evidently a serious menace to poultry farmers, and in other States strict measures have been taken to deal with it. I would suggest, therefore, that the farmers alluded to by Inspector Reid should

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* Froggatt, Agri. Gazette, N. S. Wales.

make an effort to completely destroy these noxious ticks, and that such efforts be followed by a systematic weekly inspection of their fowls at night-time, to be continued until they are satisfied that the pest is eradicated. Cleanliness is, of course, essential to successful breeding, and a thorough examination of hen-houses, coops, roosts, &c., should be made, and any places that may appear likely to harbour ticks destroyed.

In America it has been found cheapest in the long run to burn old coops, and replace them with new ones fitted with tick-proof perches suspended by wires, or oil cans connecting the roost with the frame of the building. Boiling water, kerosene, and tar are advocated as being useful remedies. Kerosene is said to be effective when the spraying is thoroughly done, and it is recommended that a fowl-house be well sprayed at least twice, and that such spraying be repeated at the first sign of returning ticks, as this species has been found to be resistant to insecticides to a remarkable degree.

In Victoria the timber used for building fowl-houses in tick-infested districts is tarred, and the trunks of any rough-barked trees that may be growing close to the building and would be likely to harbour this pest are coated with the same material up to 6 or 8 ft., and the tops cut off.*

Perches can be rendered tick-proof by slinging them from the roof on wires, which are kept well greased to prevent ticks from crawling down to the fowls.

Poultry-farmers should on no account neglect to adopt preventive measures against the introduction of the pest among their flocks, and should carefully inspect, and if necessary quarantine, all live stock, shipping cages, or crates, &c, received from outside sources.

State Farms.

WHEAT EXPERIMENTS—BUNGEWORGORAI STATE FARM, ROMA.

VARIETY TESTS.

The number of varieties tested under this heading shows a further diminution this season, twenty-one being grown, consisting of those which have yielded well here in the past, and such varieties as have come into prominence elsewhere for similar reasons.

Owing to the dry conditions which supervened between the removal of the previous season's crop and seeding time, the condition of the ground was not all that could be desired.

The seed bed was dry when sown in May, no rain having been recorded in April. For May, the rainfall was nil, and it was not until the 8th of June that sufficient rain was experienced to promote germination. The germination was fairly good, the rain not having such a soddening effect on the soil, which is a sandy loam with a fair percentage of clay, as it had on the stiff soils, where, in some instances, a

* Froggatt, Agri. Gazette, N.S.W., 1912.

heavy percentage of grain failed to germinate, rendering resowing necessary.

Rust.—This was practically absent, a few specks being noticeable on individual plants in some of the late varieties. This, so far as this branch of our work is concerned, is to be regretted, as during the past two seasons a number of very promising varieties in other respects have been grown, and no opportunity to gauge their degrees of rust resistance or susceptibility has presented itself. With a continuance and extension of the outside plot system, the collection of data under different conditions will be greatly enhanced, and such delay in ascertaining the behaviour of varieties should proportionally be reduced.

Growth.—Considering the late germination, the growth made was good; though not equal to that in 1911. The lateness of the season was only in a small measure accountable for this, the lack of subsoil moisture exercising a dominant influence in this respect. How a shortage in this direction should have occurred could not be gathered from reading the precipitation figures for June, which are 8·68 in., but when it is understood that it was made up of heavy falls, in one instance reaching 3·18 in. in twenty-four hours, on land having a slight fall, of slow capillarity, ranging from 7½ to 10 in. in forty-eight hours, enlightenment in this direction is forthcoming. It might be mentioned here that on most classes of soil whereon wheat is being grown, torrential rains experienced at this period of the season are not of as lasting benefit as when experienced earlier, for the reason that the passing to and fro of the horses and implements has so consolidated and pulverised the surface as to prevent rapid percolation and destroy the traps (clods and uneveners) which are necessary to ensure the maximum amount of moisture reaching the subsoil instead of running to waste.

Grain.—On the whole, the grain was smaller in size and of poorer appearance than that harvested in 1911.

Observations.—Though the season was favourable to the natural ripening of the new season and late maturing varieties, no data were forthcoming to show that even if such was always the case it would be necessary to alter the preconceived opinion formed—viz., that early wheats are the most suitable for this district. Owing to the expansion of the other experiment work and the curtailment of the area devoted to wheat, due to the natural soil formation of a portion of the area precluding it from being worked, it has been found necessary to reduce the original areas of ¼ acre each to half the size. Such will not increase the artificial yield, as the blocks have been reduced in length and not in width.

PLATE 32.—STUD WHEAT PLOTS AT ROMA STATE FARM—SEASON 1912.

Area : $\frac{1}{3}$ acre. *Sown :* 28th May. *Manure applied :* $\frac{1}{2}$ cwt. Superphosphate ; $\frac{1}{4}$ cwt. Sulphate of Potash.
Land cropped last seven (7) years with wheat.

Preparation necessitated one ploughing, one cultivation with one way disc cultivator, and two harrowings. After cultivation : three harrowings, viz. :—Once after drilling, twice during growth.

Variety.	Harvested.	Yield per Acre.	Seasons under Observation.	Average Yield per Acre.	Remarks.
Bald Medeah	2 Dec. ..	16	3	16·2	This wheat is largely grown in the coastal districts for fodder purposes. Grew to a height of 4 ft. 6 in. Straw coarse, hard, flaggy; very good tillerer.
Belatourka	2 Dec. ..	17·2	2	16·8	Bearded durum type, suitable for growing for silage purposes. Grew to a height of 4 ft. The greater portion of this and the previous variety were cut for decorative purposes.
Bishop	22 Nov. ..	18·1	2	24·2	This wheat is somewhat similar in appearance to Manitoba but is much earlier. If the grain proves to be of similar quality and the plants rust-resisting it will no doubt prove a great acquisition to the Downs wheatgrowers. Earing, 1st October; height, 2 ft. 6 in.
Bobs	7 Nov. ..	22·0	7	11·5	This wheat has not done so well with us as on the heavier soils. It has taken rust badly at times. The redeeming feature about it is that under adverse circumstances it produces a grain of nice appearance. Earing, 20th September ; height, 3 ft.
Budd's Early	7 Nov. ..	25·0	5	17·2	This, an old-established variety on the Downs, has done fairly well here to date. Straw highly coloured. Earing, 20th September ; height, 3 ft.
Bunge No. 2	30 Oct. ..	28·5	2	21·6	A variety of some promise, rather long and fine in the straw; weathers badly. Very suitable for growing under dry conditions. Proved rust-resister. Height, 3 ft. 6 in. ; earing, 12th September.
Bunyip	7 Nov. ..	25·9	6	13·4	This variety is one of the earliest we have; but, in keeping with other stout, short-strawed varieties, is susceptible to rust. Height, 2 ft. 3 in.; poor stooler. Earing, 1st September. Sample of grain food.
Comeback	29 Oct ..	27·4	2	32·5	The season was not suitable for this variety, and the crop, which stood about 3 ft. high, was a picture. Earing, 15th September. Grain food sample. Though the yield of this variety is high, our past experience with it precludes it from being recommended.
Cumberland	29 Oct. ..	27·4	6	16·9	Earing, 9th September; height, 3 ft. Other remarks as applied to Comeback.

Emmer	2 Dec. ..	10·4	3	12·0	So far this variety, which is recommended for growing for feed purposes, has not upheld its reputation here. From appearances it is judged that it would do better on richer soils. Tillers wonderfully. Height, 2 ft. 6 in.; earing, 10th October.
Federation	30 Oct. ..	32·8	6	13·2	The yielding power of this variety, when the appearance of the crop is taken into consideration, is most remarkable; and, were it only rust-resistant, wheatgrowing in this portion of the State would most assuredly be on a better footing in a short space of time. Some very promising crosses between this variety and Bunge No. 1, made four years ago, are under observation. Height, 2 ft. 6 in. Good stooler. Earing, 17th September. A feature of this variety is the short space of time between earing and ripening.
Florence	29 Oct. ..	24·7	2	26·4	This is one of the varieties which have done fairly well here, and on account of earliness and freedom from bunt is one we will feel inclined to recommend to growers should it prove rust-resistant. One feature which would preclude it from being grown on exposed situations is it sheds easily. Height, 3 ft.; earing, 4th September.
Hermitage No. 1	7 Nov. ..	19·1	7	14·1	Though this variety has not done exceptionally well at the farm it has proved a fairly consistent yielder elsewhere. Height, 3 ft.; earing, 17th September; medium stooler; quality grain good.
Manitoba	2 Dec. ..	12·0	7	10·4	This variety is wholly unsuitable for this district, requiring more moisture than the quicker variety, and being in 3 years out of 5 prematurely ripened off. Splendid stooler; height, 2 ft.; earing, 16th October.
Moulds	7 Nov. ..	19·6	7	16·5	This wheat in most respects is similar to Hermitage No. 1. Height, 3 ft.; earing, 17th September; medium stooler; grain good.
Rymer	7 Nov. ..	20·1	6	15·0	Splendid crop in appearance; 3 ft. high; stooled fairly well; earing, 20th September; grain good.
Sussex	7 Nov. ..	20·1	7	16·2	Flaggy crop, very even; earing, 25th September. Grain large, fair.
Ward's Poland	7 Nov. ..	18·0	2	21·8	Cross between Poland and Allora Spring. Long head and plumes; grain, durum type. Height, 3 ft.; earing, 16th September. Very difficult to thresh.
Ward's Prolific	7 Nov. ..	19·3	2	27·3	Splendid tillerer, straw fine and bright. Height, 3 ft.; earing, 20th September. Grain good.
Crossbred 349	7 Nov. ..	19·9	7	14·4	Height, 3 ft.; fair stooler. Earing, 13th September; grain good.
Crossbred 353	7 Nov. ..	24·9	6	17·2	Height, 3ft.; fair stooler; proved good dry-season wheat, susceptible to rust; earing, 13th September; height, 3 ft.

In addition to the foregoing plat sowing, thirty-two varieties were sown in short drills. Amongst these only seven were considered worthy of further trial next season. To prevent the yields in some instances from being misleading it might be stated that those wheats grown for a period of two years only have experienced much more congenial conditions than those grown for a longer period. The best average yield of the main variety grown, Bunge No. 1, for the seven years in 22·5 bushels to acre.

Statistics.

RAINFALL OF QUEENSLAND.

TABLE SHOWING THE TOTAL RAINFALL FOR EACH MONTH OF THE YEAR IN THE AGRICULTURAL DISTRICTS OF QUEENSLAND.

STATIONS.	1912.											1913.	
	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.
North.													
Atherton	...	...	...	...	...	...	...	...	...	1·11	1·72	37·99	21·06
Ayr	...	3·53	1·16	1·01	6 70	...	...	Nil	·46	1·51	0·14	8·80	11·62
Bowen	3·15	1 86	0·59	1·76	3·78	...	0·18	Nil	2·46	1·00	0·86	6·99	10·75
Cairns	16·68	5·95	4·71	5·97	8·00	...	2·89	0·75	2 25	1·54	1·71	32·03	...
Geraldton (Innisfail)*	18·24	6·01	56·14	41·84	15·25	...	3·39	2 65	1·58	2·40	1·53	32·70	32·73
Gindie State Farm ...	2·59	1·88	0·63	...	9 94	3·45	...	Nil	1·54	2·17	2·17	3·18	3·76
Herberton	2·82	1·47	1·40	2·20	2 36	...	1·30	0·53	·78	1·37	3·00	26·43	12·57
Hughenden	1·84	3·52	Nil	0·74	6 64	...	Nil	0·13	Nil	2·29	0 55	3·12	8·59
Kamerunga State Nurs.	...	...	...	...	...	...	...	...	...	...	...	...	...
Mackay	8·04	·93	3·56	3·42	5·51	...	0·23	0·2	7·28	3 03	1·66	26·17	24·13
Mossman	18·32	17·60	6·40	2·78	8·88	1·33	1·98	1·80	5·49	6·88	1·90	22 75	25·95
Rockhampton	3·24	·14	0·01	1·98	8·38	...	Nil	Nil	6 87	1·45	2 83	16·56	7·02
Townsville	7·57	6·35	4·51	0·63	4·49	...	0·17	Nil	·64	2·69	1·38	11 69	13·27
South.													
Brisbane	2·13	1·03	0·72	0·20	7·22	...	1·32	0·43	5·85	3·69	5·20	4·94	5·06
Bundaberg	2·47	...	Nil	1·33	10·23	1·76	0·78	0 22	3·74	3·14	1·01	45 48	5·36
Sandgate	...	...	...	...	...	...	...	...	...	4 25	5·38	7·24	7·39
Bungeworgorai (Roma State Farm)	...	2·19	Nil	...	7·06	...	0·33	0·22	1·96	2·20	...	3 51	2·89
Crohamhurst	8·72	13·73	1·77	1·39	9·99	1·67	1·35	0·19	6·66	4·21	8·24	17·41	8·38
Dalby	2·58	·53	Nil	Nil	4·76	...	0 63	0·87	3 36	1·98	1·18	2·95	3·57
Esk	8·26	·22	0·36	0·11	7·43	...	1·13	0·52	2·57	3·80	3·88	3·96	1·94
Gatton Agric. College	3·31	7·86	1·35	...	6 63	1·84	1·04	0·53	4·99	2·59	3·97	4·71	...
Glasshouse Mountains	6·99	13·15	0·31	0·98	7 85	1·86	1·14	0·8	6·60	4·38	3·36	17·82	9·44
Gympie	4·47	·15	0·37	0·52	2 63	...	0 92	Nil	2·94	2·28	2·49	18·17	3·91
Ipswich	3·00	·41	0·30	Nil	3·93	...	1·02	0·49	4 04	3·34	2·74	3·93	1·75
Maryborough	3·93	·11	0·32	1·09	9·12	...	1·26	Nil	5·54	4·07	3 36	23·57	5·61
Roma	0 76	·85	0·03	Nil	7·96	...	0·77	0·28	1·95	2·81	0·54	3·43	2·99
Tewantin	4·25	·85	0·80	8·46	8·72	...	0·82	Nil	6·02	4·68	3·19	14·88	11·66
Toowoomba	...	·52	0·66	0·16	6 75	...	1·05	1·08	5·41	2·05	3·91	7·45	1·81
Warren State Farm ...	1·75	2·04	0·22	1·28	9 51	3 35	...	...	...	...	0·75	12·98	4·34
Warwick	3·45	·56	0·02	0·9	5·69	...	1·37	1·50	3·75	2·65	2·37	2·50	1·29
Woodford	...	...	...	...	9·78	...	...	0·53	6·78	2 52	4·83	9·79	4·92
Yandina	4·84	·95	0·88	1·39	7·42	...	1·25	0·18	5·7	...	21·30	20 63	7·19

NOTE.—The rainfall data in this table are compiled from telegraphic reports, and must be considered as approximate only. * Incomplete. Report for 31st not received owing to telegraphic interruption.

GEORGE G. BOND,
Divisional Officer.

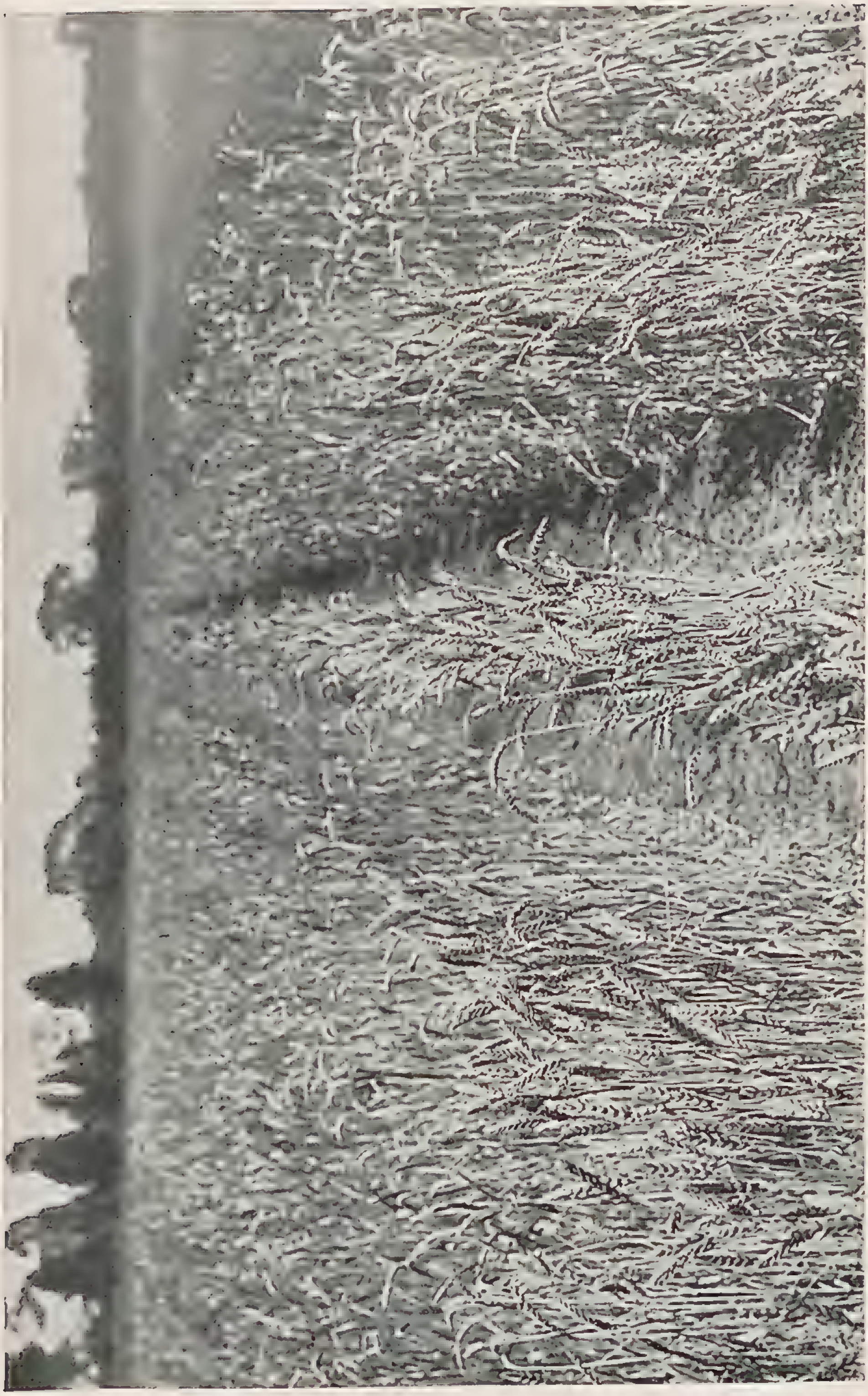


PLATE 33.—NEW WHEAT CREATIONS PRODUCED BY CROSS-FERTILISATION AT ROMA STATE FARM—SEASON 1912.

The Orchard.

FRUIT-GROWING IN THE GRANITE REGION.

Notes and Observations taken by the Instructor in Fruit Culture—Mr. CHARLES ROSS, F.R.H.S.—during his recent Visit to the Stanthorpe District, commencing on the 22nd January last.

I travelled by train across the granite belt (which commences at Cherry Gully) as far as Wallangarra at the Border, from which place I worked my way back, examining orchards *en route.* It is 35 years ago since I first knew this country, and I never remember seeing it look so well at this time of the year. There have been no bush fires, and the grass is green and abundant. The maize crops were astonishing, and reminded me of good crops to be seen on the Darling Downs in ordinary seasons. Potatoes and tomatoes appeared magnificent, and they were extensively planted, although I noticed in numerous instances where the Rutherglen Fly (var.) had ravaged and diminished the potato crop. Beans, cabbage, and other market garden crops have been fair, but not up to previous standard; and producers complained that prices had not ruled up to expectations.

The crop of orchard fruits, on the whole, will not amount to more than a quarter of last year's yield. There are, however, a few notable exceptions in one or two localities where plums, peaches, and a few varieties of apples have borne really satisfactory crops. Pears throughout have been equal to previous years. In every orchard there was scarcity and even complete absence of fruit upon certain varieties, but in most orchards exceptions were noted where some trees were carrying from fair to good crops. Late frosts were undoubtedly the principal cause of failure, and to a large extent so also was the smaller production of fruiting wood during last season, as a result of drought and overcropping. Trees situated where the morning sun could not reach them invariably carried from fair to good crops (likewise with grape vines); but in more exposed positions certain varieties only were conspicuous in that respect. The reason is simple. The blossoms being open when frost occurred, the fertilising organs, being exposed, were destroyed; whereas the varieties having already set their fruit, or which had not yet opened their blossoms, were not killed; but at either period the cold snap would probably be the cause of producing distorted, misshapen fruit. The more regular cropping of peaches and pears illustrates this point.

Spraying operations with various washes have been pretty general, but there are instances of neglect. Red oil jelly is claimed to be much safer, more economical, and quite as effectual in its use as red oil emulsion for Woolly Aphis. It was found, when arsenical sprays were used where the trees were in full blossom, that large numbers of bees were poisoned, and the precaution of not spraying until the petals are falling should be taken.

I observed in several instances where top grafting—*i.e.*, grafting at the crown instead of the base of the stem—had been very effectual in checking the distortion of the limbs of the Gravenstein apple and (when worked on the mazzard) the gumming of the cherry. Some prefer the

Plate 34.—Alligator Pear (Napoleon) Grown by Mr. C. Donnelly, Summit Orchard, Thulimbah.

Kentish stock, and for wet land it is probably the most suitable, but I should suggest double working—*i.e.*, the mazzard on the Kentish root first. I was pleased to find that Messrs. Hoggan and Rice, of Ballandean, had planted out a few Pistachio Nut trees. I am confident that this very valuable nut may be grown all over the Downs. Many years ago the writer planted 26 trees at the Hermitage State Farm, and all grew luxuriantly up to the bearing stage; but, owing to a change of policy, they were all grubbed out with the exception of two, which are now large handsome trees. Unfortunately, however, both are males. I do not know of any other Pistachios in the State, and I am glad to know that Mr. Hoggan is alive to its value.

Tropical Industries.

LONG-STAPLE UPLAND COTTON FOR THE TROPICS.

BY HOWARD NEWPORT, Instructor in Tropical Agriculture.

The question as to whether Sea Island or Upland types of cotton are best suited to Queensland has been much debated by those interested, and, so far as cotton culture has found favour at all in this State, it would seem that Sea Island varieties have, on the whole, been found the best in the coastal agricultural belts of the North, while the Uplands are the principal varieties considered in the more Southern parts.

The case for the two types may roughly be stated as follows:—The Sea Island is usually a perennial, bearing better crops in its second and third seasons than in its first, and is a long staple obtaining 25 per cent. to 50 per cent. better prices than normal Upland cottons. Varieties of this type are sometimes called Tree cottons, and, as a rule, the bushes are larger and taller than the Upland, and will stand a heavier rainfall. This type may be recognised by the dash of magenta or light red colouring in the petals of the flower, by a more deeply indented or incised leaf, and the clean skin or absent of "fuzz" on the seed.

The Upland types are usually annual, though sometimes showing perennial tendencies in the tropics, and have generally a short staple and a correspondingly lower value. The bush is smaller as a rule, and more can be grown to the acre. It is supposed to be better suited to drier situations and poorer soils. The type may be recognised by the wooliness or fuzz on the seed, by a less incised leaf, and the absence of any colouring at the base of the petal.

Between these types there are, of course, many variations and hybrids, for the cottons, like the hibiscus, to which they are nearly allied, naturally hybridise very readily.

In cultivation, also roughly, the Sea Island, while it will grow and thrive in wetter localities than Upland, must have a well-defined dry season for ripening its crop and for harvesting. The higher value obtained by its longer staple and its perennial habit does not necessarily constitute such an overwhelming advantage, however. While in North Queensland also it does best nearer the coast, in the richer soils, and where the rainfall is more continuous and heavy, the so-called advantage of its not requiring annual replanting or resowing is, to a large extent, set off by its tendency, under these conditions, to run to wood and leaf at times when the dry season happens to be shorter or not so clearly defined as usual; by a considerable rick of damage by storms, especially wind; by a protracted harvesting season; by the inevitable growth of weeds engendered by its permanent occupancy of the field rendering its cleaning difficult at all times and the cost heavy in view of the high price of labour in these parts; and last, but not least, a grave possibility of the perpetuation of pests and diseases for the same reason.

The Upland, on the other hand, in cultivation, needs a drier locality and poorer soil, and, though a smaller bush, is found to be quicker maturing, ripening its bolls more uniformly, and to be therefore more easily and cheaply picked. In favourable localities for growing Upland cotton there is less risk of loss by storms or wet weather during harvest. The returns per acre very nearly, if not quite, equal the longer-stapled Sea Island cottons in quantity, though not in quality or price. As a field crop it admits of a cleaning up annually, and may be ploughed out immediately after the crop is off, and the field fallowed for a few months before the resowing for the next season's crop. This involves the destruction of the old bushes and, with them, any pests that may have made their appearance during the season; it allows for better and more thorough tilth, and at the same time is easier, more satisfactorily and cheaply, kept clean than the periodic weeding and hoeing necessary for the permanent or perennial Sea Island types can do.

Given suitable climatic conditions, therefore, while the Upland cotton crop may be of less intrinsic value, its cost of production is often less, and the proportion of profit quite as great as that of a field of Sea Island cotton.

The obtaining of the climatic conditions, or, inversely, the selection of the type of cotton suited to given climatic conditions, is a factor of far greater importance in the successful cultivation of this staple than would appear to have been recognised here as yet. These two types are by no means interchangeable at pleasure on most selections or farms; though the selection of the wrong type has in some instances, without doubt, been one at least of the principal causes of want of success, and in which cases success would be induced by such a change.

In this vast country there are hundreds of acres of land of all kinds and classes with equally divergent climatic conditions, and greater attention to the adaptation of suitable types to the climatic and soil conditions found to exist on a given selection, or where the staple is already determined upon, the more careful selection of suitable sites for plantations, would go far towards producing those individual successes so necessary here for the establishment of any new staple industry. It can not be taken for granted that, because maize can be grown, any species of cotton crop must, therefore, necessarily be a success.

In Northern Queensland it would seem more likely that cotton culture might be established as an industry in the drier portions of the plateau, and that probably with the shorter-lived but more easily and cheaply cultivated and produced Upland types.

Wherever cotton culture is established as a staple industry, scientific investigation has not been idle both in the improvement of methods of culture, in harvesting, and in the improvement of varieties. Among the Sea Island types the search for more reliable cropping varieties has, however, not met with as great success perhaps as the search for, or efforts to evolve by hybridization, a long-stapled species among the Upland types. Numerous trials have been carried out in the United States which have shown that new varieties of Upland cottons are to be

found that are adapted to the tropics. These varieties, so far, would seem to retain the characteristic preferences of the Upland types for dry conditions, though irrigation has been found feasible and beneficial in increasing the length and quality of the staple. This may be taken to imply that, possibly, these varieties will thrive somewhat nearer the coast, or at least under a rainfall heavier than that essential for the normal Uplands, though probably still necessitating a very clearly defined dry period.

Allen's Improved Long-staple Upland Cotton and a variety named the Sunflower are mentioned as some of the most satisfactory results of such trials; and now another variety, called the "Durango," is spoken of by Mr. O. F. Cook. Of this it is said in the "Tropical Agriculturist" of October, 1912:—"The variety called Durango is said to be superior to the old long staples. It is described as early and prolific, and producing larger bolls than Allen and Sunflower. The lint, if not as long, is more abundant and uniform in length—about 1¼ in. under favourable conditions. Other advantages stated are that the bulk of the crop could be gathered at one picking, and that the plant is decidedly drought-resisting. With the soil of the right texture and a supply of moisture through irrigation, it has been found possible to grow long-staple cottons such as this variety in a dry atmosphere. Too free irrigation is to be deprecated, and, given good tilth and a wet season for the germinating of the seed, it is found better to resort to irrigation only to protect the maturing crop against injury by too severe drought."

In Uganda the following results are available of trials with the two former cottons:—Allen's Improved Long-staple Upland Cotton there yielded over 1,000 lb. of seed cotton to the acre with an out-turn of 30·6 per cent. lint, which was reported on as being clean, lustrous, soft, cream-coloured, and free from stains, of excellent quality and good lustre, a fine, long, silky staple of fair strength that varied in length from 1·1 to 1·8 in., averaging between 1·4 and 1·6 in. It was valued at 9¼d. to 9½d. ginned, when middling American was 5·93d. Taking the lower figure, this gives us a return of about £12 worth of lint per acre.

Figures for the Sunflower variety are not given, this being dismissed with the short statement that it was also tried, but found not so good.

Neither the Sunflower nor Durango, so far as I am aware, have yet come to North Queensland; but Allen's Improved has, and some very interesting experiments have been carried out at the Gossypium Park Estate by its director, Mr. Joseph Campbell, M.A.

Seed was received by Mr. Campbell from the British Cotton Growers' Association through Mr. H. Crankshaw, of Letchworth, Herts, England, and was sown at Gossypium Park, Kamma, near Cairns, in August, 1911. Unfortunately, 1911 was a very dry season (the latter part of it), and anything but a favourable one for cotton; also, the planting on this occasion (owing to the late arrival of the seed) was rather out of season. The new variety was not found to be drought-resisting under these conditions, though it might prove more so if sown earlier in the year. Possibly for the same reason, it proved a shy bearer

in this experiment, producing only at the rate of some 200 lb. per acre. The out-turn, however, was most promising and indeed higher than has been as yet recorded, I believe—viz., 35 per cent. of clean lint of excellent quality. This is very considerably above the average for Upland cottons here.

As already stated, this experiment was an out-of-season one, it being necessary to germinate the seed when received for fear of its losing its

Fig. 1.—Allen's Upland Cotton in the Field.

Fig. 2.—Leaf, Flower, and Boll, showing Upland characteristics.

vitality if kept till the next year. Better results are anticipated in the matter of growth and returns with the acclimatised seed now obtained, and by more seasonable sowings, which the good out-turn obtained more than warrants. Mr. Campbell, therefore, is following up the experiment with his own new seed by sowing another plot this month (February)

for a harvesting in September next, the results of which will be awaited with interest.

The illustrations show (Fig. 1) the Allen's Improved Long-staple Upland Cotton in the field at Gossypium Park. Fig. 2 illustrates the

Fig. 3.—Newly-picked Sample of Allen's Upland Cotton.

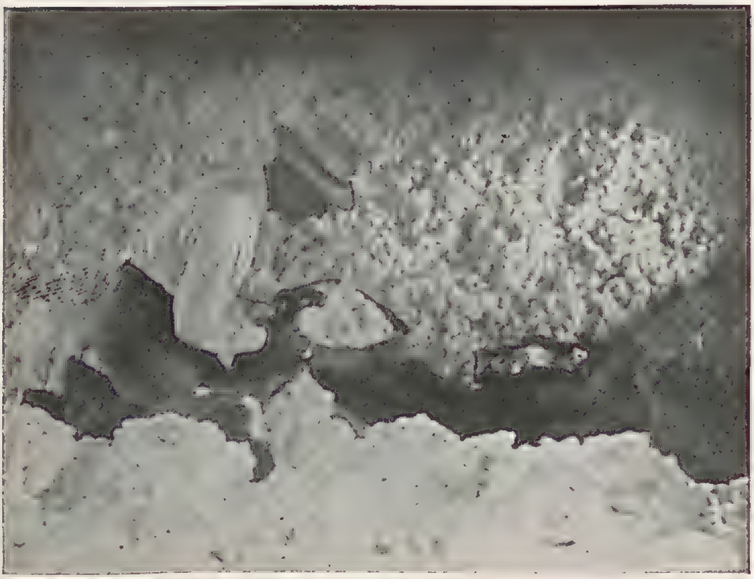


Fig. 4.—Allen's Upland Cotton in Bulk in Store.

leaf, flower, and boll, clearly showing the characteristics of the Upland type. Fig. 3 is a sample of newly-picked "Allen" cotton in the seed; and Fig. 4, the cotton in bulk in the store at the Gossypium Park ginnery.

RUBBER.

THE SYNTHETIC CHEMIST AND HIS RAW MATERIALS.

From the point of view of riders of that amusing but expensive and unremunerative hobby, the search for synthetic rubber, the price of turpentine will always have a distinct interest. Messrs. James Watt and Son, in their report on rosin and turpentine in 1912, state with regard to turpentine that the greater part of the year 1912 was a long reaction from the inflated prices of 1910 and 1911. The rise from 25s. 6d. in April, 1909, to 74s. 3d. in March, 1911, was followed by a fall to 27s. in November, 1912. During the month of December the market was subject to violent oscillations, the extremes being 31s. 9d. and 27s. 7½d. The average price for 1912 is slightly below that of 1909, but above that of 1908. Lower prices have increased the consumption. In America the present crop promises to be at least as large as that of 1911-12. In France much the same conditions have prevailed. Spain and Portugal appear to have had good crops during the past year. Many other countries are bestirring themselves to tap their pines for turpentine, either as a new departure or with increased energy. The imports into Great Britain from all countries amounted during the year to 32,811 tons. The average price of American turpentine during the year was 33s. 1d. per cwt.

From a synthetic aspect this is distinctly encouraging, as, by purchasing the whole of the imports for conversion into isoprene, an energetic chemist would be able to put no less than 3,000 tons of evil-smelling table-jelly on to the rubber market at a cost of a little over 2s. 6d. a lb. for materials alone, without allowing for costs of manufacture, interest on capital, and any rise that might occur in the price of turpentine by the advent of so spirited a purchaser.

Even if he turns from turpentine to starch, the synthetic rubber man is confronted by a rise in the price of tapioca, due to the fact that large areas formerly devoted to tapioca planting are now being planted to rubber, a crop the prices of which will probably remain as high as at present for at least two years, and may possibly advance. Little tapioca planting is being done, and it is not likely that any will take place until either the price of rubber falls or that of tapioca becomes so high as to make its culture more profitable than that of rubber. The only thing really left to the chemist, it seems to us, is rubber itself. He might buy plantation crepe, and, so to speak, "shatter it to bits" and build it up again nearer to his heart's desire. The product no doubt could be used as a boot polish, or a hair restorer, or both.—"Rubber World."

PREPARATION OF COPRA.

The preparation of copra, although very simple, entails nevertheless some care to produce an article of good quality. The preparation consists in separating the kernel from the shell in which it is enclosed, and in drying it. In Ceylon, in order to remove the fibre from the nuts, the operator throws them violently against a metal spike, then splits the

nuts down the centre, and finishes the preparation of copra by drying them either in the sun or in an artificial drier. Drying causes a shrinkage of the kernel, which can then be easily separated from its woody shell. When drying has been carried far enough, and the copra roughly broken or left in large pieces the size of half kernels, it is packed for export or for delivery to the oil factory. The natives are satisfied with drying copra by exposing it to the sun in thin layers round their houses, the inside of the kernels uppermost. As they rarely take the trouble to put it under shelter when it rains, drying is generally carried out under bad conditions, and thus a product of inferior quality is obtained.

More precautions are taken on the estates managed by Europeans, and especially on that of Mr. Wright, a planter near Mirigama. In order to dry his copra Mr. Wright employs a sort of oven, in which the nuts are placed in layers about 20 centimetres deep, after they have been cut in two and the fibre removed. They are then laid on metal bars placed at short intervals from each other, the inside of the kernels downwards. The oven is heated with the shells, which make excellent fuel, as they burn steadily. The shrinkage caused by the evaporation of the moisture held in the kernel enables the pieces of copra to be easily removed.

Hot-air driers for copra are not yet commonly used, but it is probable that their use will become general on estates managed by Europeans, as they enable one to produce a uniform article and one which is thoroughly dry. Some plantations in Trinidad, West Indies, are now beginning to make use of this improved method, as is also the German Trading and Planting Company of the South Seas, which has planted the enormous cocoanut groves in Samoa. In cases where it is acknowledged to be advantageous to prepare copra by exposing it for a time to the sun, it is advisable to adopt the type of free-air drier used in Java for the purpose of drying cinchona bark. This system has the advantage of being economical.

In the case of very extensive plantations one can use the free-air driers as described by Mr. Elot in his pamphlet on cacao and other important crops of Trinidad. These driers are made of large metal roofs which can be moved on rails. This enables one to expose the copra while the sun shines and to put it under shelter at the least sign of rain. According to Dr. Davillé, the method of working in Taiti and the neighbouring islands is somewhat different. The natives split the whole fruit into two pieces by striking them lengthwise with a hatchet. By means of a knife or pointed bone they then lift a piece of fibre 1 centimetre broad from the outer surface of each half nut, to enable them to reunite the halves, tie them together in pairs, and suspend them on cords, wires, or creepers stretched horizontally, taking care to fasten them so that the inside of the nuts is turned towards the sun and to put them as far as possible in places sheltered from rain. At the end of two, three, or four days, depending on the weather, the copra falls to the ground of its own accord. The natives then gather up all the pieces and make holes in them, stringing them on small cords, so as to make a kind of large necklace consisting of spherical caps fitting into each other. The copra from these places is generally sent to San Francisco in this form—*i.e.*, without any further breaking.

The method of preparation called by Dr. Davillé " smoke desiccation" may also be used. It is described in his work on the cultivation of the cocoanut, which was written in 1899. This method consists of drying the kernels, after they have been broken in two, in a kind of hut, which is generally termed a " smoke-house" These huts are about 10 metres long by 5 metres broad, and are made of solid wooden posts sunk a metre deep in the earth, bound by cross pieces and supporting a light roof, the lower edge of which is 2½ metres above the ground. The walls are made of corrugated iron sheets, nailed to the posts which support the roof; the ceiling is made of sticks or preferably of metal rods 1 centimetre in diameter, placed 3 or 4 centimetres apart, and supported here and there by uprights. Then shallow holes, in which the shells or wood used as fuel are placed, are dug out in the floor at a distance of 1 metre from each other. After removing the fibre, the cocoanuts are broken and then laid out in regular layers, 20-25 centimetres deep, upon the lathes or bars forming the ceiling. The fire is then lighted, and the " smoke-house" carefully closed. At the end of two or three days, drying is generally well advanced. The copra is then withdrawn and removed from the shells, using a knife or piece of pointed wood if the kernels still adhere to them. It is also possible, as Dr. Davillé remarks, to replace the smoke-house by a similar but less expensive building, by digging a big ditch 2 metres deep, over which is laid, resting on the ground, a floor with openings similar to those which have just been described. The whole is then surmounted by a small roof approximately 2 metres high. The bottom of the ditch serves as the hearth. Desiccation under these conditions takes a longer time than in a smoke-house of corrugated iron.

Whatever precautions are taken in preparing copra by drying it with smoke, it is almost impossible to obtain a product of really good quality. It is, therefore, advisable only to employ this method when it is impossible to do otherwise, and to give preference to drying in the sun, ovens, or stoves, which tend to prepare a product of a very pale colour, for which there is always a sale at very remunerative prices.

The care bestowed on the preparation of copra always has considerable influence on the value and quality of the products—oil and cake—derived from it. The extra price value may reach and even exceed £2 per ton, and it will doubtless continue increasing more and more; for the manufacture of very white and pure oils, of soap of superior quality, and above all of cocoanut butter (vegetaline, palmerine, &c.), tends to expand every day. It is, therefore, essential that planters should aim at producing only thoroughly dry copra of good quality and as little discoloured as possible.

The planters in the English colonies in the Far East have long recognised the care which they must bestow upon the manufacture of copra. Their attention was drawn to this point by the superiority of the oil and dried kernels coming from Cochin (which is situated on the West Coast of British India and a little to the North of Cape Comorin), which to-day have a great reputation, and which always reach, both on the Marseilles and London markets, a much higher figure than the same products of any other country. This difference sometimes reaches nearly

£4 a ton. For instance, in November, 1910, Cochin oil was quoted at Marseilles at £26 5s. per ton, although the market price of ordinary cocoanut oil did not exceed £22 12s. 6d. per ton. The planters of Ceylon, which is situated only a short distance from Cochin, were the first to be roused to this state of affairs, and they endeavoured to find out to what this superiority was due. At first it was attributed to climate and soil, but the investigations carried out by the efforts of the "Tropical Agriculturist" seem to prove that the value of Cochin copra and oil is due to the care with which the nuts are harvested and dried. The following conclusions may be drawn from the investigations:—

1. The purest oils and those of the best quality are extracted from the least discoloured copra, which is only obtainable from nuts harvested when thoroughly ripe.
2. Drying by smoke and in ovens when badly carried out are objectionable, as they give rise to more or less darkly-coloured copra, emit a decided smell of smoke, and leave a residual cake of inferior feeding quality.
3. Sun-drying gives excellent results when properly carried out.
4. Copra of excellent quality can only be prepared from thoroughly ripe nuts.
5. Preparation by exposure to the sun is carried out with the greatest care by the natives of Cochin, who are more energetic and perhaps also better agriculturists than the Cingalese. They, too, take care to prepare their copra and oil from only those nuts which are thoroughly ripe.

The drier the country in which the estate is situated, the easier the preparation of sun-dried copra, so that this method will not have any serious difficulty to contend with on the western slopes of Madagascar. It will, perhaps, require as in some districts of Ceylon, special arrangements on the East Coast, where the rains are so frequent. In this locality the cinchona driers of Java, to which we have already referred, might be advantageously used, or preferably, when the importance of the industry warrants it, suitable hot-air stoves, which have the great advantage of allowing rapid desiccation at all times, might be started. In very wet countries and when it is impossible to go to the expense of stoves, it is advisable to make copra in ovens, provided that fuel giving off the minimum amount of smoke be used.

These various points make us attach great importance to the lesser details of sun-drying, which, according to the care taken, will produce either the best or very inferior copra. According to an experienced Ceylon planter, the following procedure is recommended:—

Thoroughly ripe nuts are first selected and gathered only when of a dark-brown colour. They are then placed in heaps until it is time to start the drying, which must be begun within three or four weeks of picking. At this time the kernel may be easily removed from the shell after short exposure to the sun, and often when the nut is first opened. The nuts must then be broken and spread out side by side right in the sun on a day as dry and hot as possible, taking care to prevent any

particle of dirt or sand coming in contact with the inside of the kernel. It is, therefore, a good plan to spread out the copra on mats until a dry film, to which foreign matter cannot adhere, is formed by evaporation on the inside of the kernel. By rubbing the copra gently with the fingers, any sand is then easily removed. At the end of a few hours this operation is usually complete. Then the pieces of hard shell are removed and the drying finished by spreading the copra out in a suitable place either on mats or on the ground. The nuts must only be opened during the morning to allow the surface crust to form before night. A little before sunset the kernels are placed in long heaps 30 to 40 centimetres high. On the next and following days they are again spread out until drying is complete. Rain even of short duration will do much damage to the colour of copra. Shelters, into which the nuts can be quickly removed when the weather is threatening, seem to be indispensable on the entire East Coast of Madagascar.

CONCLUSIONS.

At the present time sun-drying is certainly the best method for use on the western slope of Madagascar. It must, however, be carefully carried out. This method will give equally good results at certain places on the East Coast of the island, provided that drying-rooms with shelters are erected; but in many places, and especially during the rainy season, the preparation of copra by means of ovens and the use of hot-air stoves is preferable.

It is needless to add that the returns are very variable. In Ceylon it is estimated that 4,800 to 5,500 nuts are required to produce 1 ton of copra. In Trinidad 6,000 are taken as the average. In this connection it is interesting to note the experiments carried out by M. Rideau, a planter in Annam, which were published in 1901 in the "Revue des Cultures Coloniales." These experiments were carried out on 1,000 cocoanuts, and were repeated each month for a whole year.

The quantity of copra produced by 1,000 nuts and the number of nuts required to yield 1 ton of copra were as follows:—

Month.		Kilos of Fresh Kernels from 1,000 Nuts.	Kilos of Copra from 1,000 Nuts.	Number of Nuts Required to Make One Ton of Copra.
Winter Season	November	316·0	175·3	5,704
	December	315·8	179·2	5,580
	January	321·5	160·4	6,234
	February	330·5	173·5	5,763
	March	338·0	173·5	5,763
	April	345·0	167·3	5,977
Summer Season	May	425·0	196·5	5,089
	June	340·0	168·0	5,780
	July	328·0	176·0	5,680
	August	312·0	181·0	5,524
	September	325·0	182·0	5,494
	October	296·0	173·0	5,780

Taking the average for the twelve months, 1,000 nuts yielded 332 kilos (730 lb.) of fresh kernels and 175 kilos (385 lb.) of copra. To

produce 1 ton of copra, an average of 5,677 nuts were required—that is, 2·53 nuts produced 1 lb.; or 5·57 nuts, 1 kilo of copra.

The above notes on the manufacture of copra have been taken and translated from "Le Cocotier," a standard work on cocoanuts by M. Prudhomme, Director of Agriculture for Madagascar, to whom our grateful acknowledgments are due.—"Agricultural Journal of tu Companhia de Moçambique."

SOME CAUSES OF PAPAW TREES FAILING OR DYING.

By C. E. WOOD, Manager, Kamerunga State Nursery, Cairns.

On more than one occasion I have had inquiries with regard to papaw trees dying without any apparent cause. Where numbers of these trees are planted in the form of a grove or a plantation it is not surprising that a tree here and there should die out, especially as being such a soft-stemmed tree it might receive injury and yet not be noticed until too late; but it would be impossible for me to say why a tree, apparently healthy and growing well, should suddenly die, especially when I have seen neither tree nor place where it was growing, but I know only too well that papaw trees do, at times, either die or go off very suddenly, and only on one occasion could I trace it to insect attack. In this case the tree had been bored about 3 ft. from the top (the tree was about 8 ft. high), and, on cutting open the stem right up to the terminal bud, I found a grub embedded in the latter and with apparently no outlet; the grub looked like the larva of one of the Chafers, but as it got damaged I was unable to send it to the Government Entomologist.

Other known causes of death and sudden going off are—

1. Roots rotting from water lying at the base, showing want of drainage.
2. Tap and other roots eaten through by cane grubs. If cane grubs are suspected, inject bisulphide of carbon.
3. Nematode or eel worm. In this case, the leaves wither and die, and the fruit either fall or fail to mature properly. On examination, swellings and lumps will be found on the roots. Trees thus attacked, but which I have especially wished to save, have continued to grow and bear good crops after being well limed, and later fed up with either artificial or liquid manure.

During the last year many papaw trees, both at this Nursery and other places, have been attacked either by a disease or insect which causes the stems to rot, and in very many cases kills the tree. I have been unable, so far, to detect any insect doing damage, though the earliest stage appears to be a puncture either near the base of the leaf stalk or on the green portion of the stem. This, when looked at under a glass, even at this early stage, has a dried and somewhat netted appearance. Later, these marks increase in size and spread, or fresh punctures are made; the head of the tree gets bunchy, and the stem has the

appearance of gradual rotting. Further specimens will be forwarded to the Government Entomologist.

On inquiry from others, I find a similar disease or pest has at times been prevalent both at Innisfail and on the Bloomfield, and, for a time at least, papaw-growing was a failure. I also find that in 1895 Mr. Cowley, of this Nursery, reported a disease (?) or pest in papaws received from India and Honolulu, which appears, from his description, to be somewhat similar to that lately attacking many trees in this district. On referring to the Annual Report for 1894-95, I see that Mr. Tryon, the Government Entomologist, mentions receiving specimens of papaw tree attacked by a tunnelling insect, but whether this is the cause of the present trouble remains to be seen.

However, I would advise anyone seeking to find out the cause of a tree dying to communicate with Mr. Tryon, and, if possible, send portions of the part damaged, or, if imposible to assign any cause, to describe the symptoms and nature of the soil, &c., and in all instances it is well to examine the roots, as, in most cases, I have found them the seat of trouble.

TOBACCO HARVESTING.

By R. S. NEVILL, Tobacco Expert.

As the time is now approaching for harvesting the splendid tobacco crop we have in prospect, it is well to give a few words of caution to beginners in tobacco-growing. Tobacco should not be allowed to get over-ripe, or, as it is sometimes called, "dead ripe," for in that case it will cure dark and dark-brown; if cut green, it practically will not cure at all, but be green and dingy stuff. It should be cut when the middle leaves of the stalk are just well on the ripe side, which will be known by the leaf drooping, and being slightly brown and green, and a little inclined to puff on the surface, like paper when water is dropped on it. It should not be cut in the heat of the day, and cutting should cease when the tobacco ceases to wilt after it is cut, usually from 4 to 6 o'clock in the afternoon; but if the day be cloudy and the sun obscured, then cutting can be done at any time.

After the plant is cut, it should always be handled carefully to prevent bruising, laid down gently, and care should be taken not to let any of the leaves double up under the plant and break. Be careful not to hang too thickly on the stick. It is better to hang it too thin than too thick—usually, with ordinary-sized plants, about 3 plants to the foot; or, in the case of very large plants, about 2 to the foot. Thus, if a stick is 4 ft. long, from 8 to 12 plants; and 10-ft. sticks, from 20 to 30 plants. If the weather is clear and bright, it is best to put it on a scaffold for a week or ten days, but it should not be rained on. In scaffolding, push the sticks up close together, so that the tobacco will yellow. It will fall apart as it begins to dry. If you have it, it is a good idea to spread butter or cheese cloth over the top of the tobacco on the scaffold to prevent the bottom leaves of the plant from burning. The tobacco

should be well opened out on the stick, and all matte or tobacco stuck together shaken out before pushing the sticks up close together on scaffold.

A word to those who cannot afford to buy iron to cover their sheds. Thatch or bark is better for tobacco sheds than iron, as the tobacco will cure better under such covering. As the sheds will keep a cooler and more uniform temperature, the tobacco cured under such sheds will be more stretchy, and elastic, and will weigh better.

Note that the above refers solely to Pipe Tobacco.

NEW SOURCES OF PAPER.

(*HEDYCHIUM CORONARIUM.*)

Of all raw material, a new fibre is perhaps the most difficult to introduce to the market; it has to be as good and as cheap as (often better and cheaper than) one of the old fibres, and it must be produced on a sufficiently large scale to make its supply uniform. In the case of a fibre possessing exceptional qualities, the difficulties attending its commercial introduction are reduced; and this applies to some new sources of paper which have recently received attention in the "Kew Bulletin," No. 9, 1912.

Early last year, Messrs. Clayton Beadle and Stephens drew the attention of Kew to the value of *Hedychium coronarium* as a source of material for paper-making. This plant, a member of the natural order Zingiberaceæ, to which ginger belongs, is a native of India, but is also recorded from Central America, the West Indies, New Zealand, Mauritius, and West Africa. It flourishes only under tropical swamp conditions, and large areas covered with this plant are to be found in Brazil. The plant is characterised by the horizontal tuberous rootstock, which bears erect elongated leaf stems 3 to 5 ft. high by ¾ to 1½ in. thick. The aerial portions of the plant are not unlike those of the maize in general appearance. After cutting down the stems, it is found that four to five months must elapse before a fresh growth of stems is made. The specific characters of the plant are:—"Inflorescence ellipsoid or ovoid; 3—5-flowered bracts which are densely imbricate (overlapping) in 5—8-spirals Staminodia (barren stamens) oblong-lanceolate, white. Labellum (strongly developed petal) widely obcordate (inverted heart-shaped), white, with yellow sometimes near the base. Filament white."

Having satisfied themselves as to the good qualities of Hedychium fibre from dried material received from Brazil, Messrs. Clayton Beadle and Stephens made further investigations with fresh green material obtained from growing plants at Kew. In a letter to Kew, Messrs. Clayton Beadle and Stephens wrote:—"Papers produced from this fibre have even greater tensile strength than the strongest manila papers produced. The strongest manila papers have a strength of 6,000 to 7,000 metres 'breaking length.' This paper has from 9,000 to 10,000. Its elasticity and folding qualities are exceptional. Moreover, it can be made to bear ink and possess parchment qualities without any sizing or other

special treatment. The reason for this we find to be due to the presence of the cells associated with the fibre which are of a semi-gelatinous nature, when chemically treated, and dry into the interstices of the paper and produce natural parchment.''

The following is an extract taken from a paper recently presented to the Eighth International Congress of Applied Chemistry by Messrs. Clayton Beadle and Stephens:—'' We draw attention to this fibre, as we believe it may become of great industrial importance to the paper trade. Where circumstances are congenial to its growth, the plant spreads to the exclusion of all other vegetable growth by means of its rhizomes so that it can be harvested at least once a year, producing a heavy crop. It is an easy pulp to manipulate. It is capable of producing a paper of exceptional strength, and can be worked either bleached or unbleached. The fact that the paper in its natural state, without the addition of any materials whatever, can be made to possess grease-proof and self-sizing qualities is a point of commercial importance.''

These investigators have also dressed some of the fibre from the green stem, and the tensile strength tests indicate that it is almost exactly similar in strength to the best pure manila hemp, which is the only fibre that can be used in the self-binding reaper machine.* It might be added that manila hemp is practically a monopoly of the Philippine Islands, from which the export was 121,637 tons in 1904, valued at £4,188,835; but this has declined to 146,208 tons, valued at £3,025,036 in 1911.

In view of the valuable nature of Hedychium two other members of the same natural order—*Amomum hemisphericum* and *Alpinia nutans*—were submitted to Messrs. Clayton Beadle and Stephens for examination. It would appear from this report that these two species, particularly *Amomum hemisphericum,* could be made to produce a strong brown paper with a long tear, and although less valuable than Hedychium these species might prove very useful sources of material for paper-making.

Amomum hemisphericum is a native of Java. *Alpinia nutans* is recorded from Hong Kong, Formosa, Cochin China, the Eastern Himalayas, and the Malay Peninsula. It is also known from the West Indies, Guatemala, Venezuela, Surinam, and Brazil; but, like Hedychium, it has probably been introduced into the Western Hemisphere from the East.—'' Agricultural News,'' Barbadoes.

THREE USEFUL VARIETIES OF GOURDS.

By HOWARD NEWPORT, Instructor in Tropical Agriculture, Cairns.

The term Gourd to most settlers conveys the idea of an annual creeper or climber producing more or less large fruit of no practical use, and which, when ripe and dry, is hollow and has a tough skin or shell. This, however, is only a rough and ready description of one family of one tribe of the natural order Cucurbitaceæ. The order embodies a

* Sisal hemp has proved successful as binder twine for reapers and binders in Queensland.—Ed. " Q.A.J."

number of tribes, and quite a considerable number of genera, not to mention species, to all of which the term gourd may be correctly applied. Our Colonial Botanist, Mr. F. Manson Bailey, C.M.G., in his Queensland Flora, gives three tribes and fifteen genera as having examples in this country, most of which are indigenous.

These plants—or perhaps it would be more correct to say, fruit—to which the term gourd is commonly applied here, are usually of the tribe Cucumerineæ and the genus *Lagenaria.* To the various genera of this tribe belong many other well-known vegetables, as well as ornamental garden creepers. To the Gourd family, therefore, though to different genera, the settler is indebted for the ubiquitous pumpkin, the vegetable marrow, and, as the name itself suggests, for the cucumber, as well as many others.

FIG. 1.—THE SNAKE GOURD (TRICHOSANTHES ANGUINEA).

I propose to deal only with an example each of the first three genera —*Trichosanthes, Lagenaria,* and *Luffa.* To take these in their natural order, an example of the first is illustrated in Fig. 1. *Trichosanthes anguinea,* commonly known as the Snake Bean, the Snake Gourd, the Carpet Snake Bean, Indian Snake Vegetable, or by the Solomon Island name of "Guada" Bean. This has recently again attracted some attention, and has involved some correspondence in the Press and journalistic notice. I say "again" because many of these plants are old, in fact the Cucurbitaceæ are some of the oldest tropical plants recorded, and from time to time one or other species attracts the attention of some enthusiasts who, not having met with it before, start a new series of paragraphs and letters which make more or less similar rounds of the tropical publications. Attention drawn to worthy members of a botanical family, if correct, is of course most useful, and is at the same time quite new to many readers, but it does not follow that the plant or fruit is new.

Similarly the Snake Gourd, to give it its commonest name, to which attention was drawn a few months ago by a resident of New South Wales, who obtained seed from the Solomon Islands, though new to many, and perhaps not very well known by its botanical name, is by no means new to Tropical Queensland. It was growing at the Kamerunga State Nursery, Cairns, for instance, ten or twelve years ago, as well as in a number of private gardens in the North.

As already pointed out, this is really not a bean, but a gourd, though one that does not dry with a hard shell. In fact it has been very aptly likened to a hollow cucumber. Like most gourds, the plant is quick growing, the flowers and leaves are typical of the genus, and a specimen of the flower, which is white and 5-petalled, may be seen in the illustration above and slightly to the right of the fruit. The illustration is from a specimen growing at Kairi State Farm, near Atherton.

The fruit grows to considerable length, though not often more than 4 to 5 ft. Specimens 7 ft. long would be exceptional. When ripe, the end of the fruit commences to change colour, often to a red, and if the weather be wet, will rot away, allowing the seed, which by this time have generally fallen to the bottom of the tube-like fruit, to fall out. The seed are irregular in shape, and were not found, in North Queensland, to be of long vitality. This is contrary to the habit of most of the gourd family. For table use the snake gourd may be cut at any time previous to that of its changing colour, and even after this sign of over ripeness is apparent, the upper portion may be used for culinary purposes, for the stringiness or toughness usual in most gourds is absent in this species. When young, the fruit is slightly hairy or rough, and if scratched or scraped has a very distinctive and rather disagreeable scent. This smell will disappear, but before cooking it is well to scrape the bean. When cut into lengths of 3 to 6 in. and then stripped into numerous slices of about ¼-in. wide, it is very much like a particularly fine dish of French beans both in appearance and flavour. It retains its vivid green colour better than most beans do when cooked. Another and a pleasant way of using it in India is to stuff 3-in. lengths of the bean with minced meat, &c. The snake bean, being hollow, appears to contain more food substance than it really does. A bean of 5 to 6 ft., weighing 2 lb., would be a very well-grown one; the average weight of average beans would be but little over 1 lb., which would be again reduced when cooked, so that a 3-ft. or even a 6-ft. bean would not go very far in satisfying hungry people.

Very wet weather as well as very dry weather has been found to hinder the full development of this bean in North Queensland, and seed sown out of season result in poor vines and poor or no crops. A vine on an average bears five to seven good pods, but many have a lot of blossoms and numerous small pods that fail to attain maturity. It likes conditions very similar to the requirements of the Choko or Pear Vegetable (*Sechium edule*), and may be grown in a similar manner on a trellis, fence, or bough shed such as are generally used for granadillas.

The second example is that of the genus *Lagenaria,* the largest in number of varieties and the genus embracing what is commonly considered the true gourds. Among the *Lagenaria* are the Bottle Gourds, the Pipe Gourds, the Giant Gourd, and the Butter Gourd, &c. The illustration (Fig. 2) is of a group of Butter Gourds (*Lagenaria vulgaris, variety*) at the Kamerunga State Nursery. These may be called the poor-man's vegetable marrow of the tropics. When fully ripe and dry, these gourds have a tough shell, and hence might be used in a similar manner to the bottle gourd, but if cut when quite young are excellent eating—hence the name Butter Gourd. This variety bears best on the ground, where each vine will carry five to ten large fruit up to 3 ft. in length and 6 in. in diameter. They can be grown on a trellis or fence equally

FIG. 2.—THE BUTTER GOURD (LAGENARIA VULGARIS).

readily, and the fruit, when it hangs, is generally straight, whereas when on the ground it often assumes most fantastic shapes, even, it is said, forming a complete knot. The most fantastic shapes are obtained, however, with a variety that is usually only 2½ to 3 in. thick. All of this type of gourd are not, however, eatable, many possessing a very unpleasant bitterness. The seed of most of these, when mature, are said to be a drastic laxative, and are used for various medicinal purposes in India and the East, so should be avoided. The Butter Gourd is hardy, and has been found prolific in North Queensland, and is worthy of greater attention.

The third genus is represented by specimens of the *Luffa ægyptica,* the well-known vegetable sponge, also known as the towel gourd. This

has very similar characteristics as the foregoing, requiring similar conditions. To get the best fruit, however, these should always be trained on to some support. The distinguishing feature of this species of gourd is, of course, the curiously intertwined fibres that give it its common name. These, however, do not begin to develop until attaining maturity, and when quite young, these gourds are considered good to eat in many countries. The vine is fairly prolific and hardy here, and the "sponges" are well known, if not commonly used. They are offered for retail sale at 3d. to 6d. each, according to size and colour, though they are more often done up in some fancy form or shape, such as a bath-glove, and sold at a considerably higher figure. The Luffa would be well worth cultivating for the market; a considerable demand exists, which is largely supplied by importation. Vegetable sponges are grown to quite

Fig. 3.—The Sponge or Towel Gourd (Luffa ægyptica).

an extent in Japan, in fields on a rough kind of trellis of bamboo. There, each vine is said to give five to six good sponges, and an acre to produce 24,000 of them. The harvest takes place in September, when the cleaning of the newly-harvested gourds is largely done by hand. If the gourds are well grown, and the time of harvesting dry, the outer skin can be removed quite easily, and the seed readily shaken out. Very little washing is required, and the sponges are bleached, after dipping in a weak bleaching solution, by hanging them to dry in the sun. Vegetable sponges are an important article of export from Japan to Europe and America. The illustration (Fig. 3) is from the Kamerunga State Nursery.

BOTANIC GARDEN NOTES.

BY J. F. BAILEY, Director.

PALMS—(*continued*).

The genus Cocos is represented by about twenty-five species, most of which are natives of South America, especially Brazil. The name is derived from the word Coco, the Portuguese for a monkey, in allusion to the end of the seeds of several species resembling a monkey's face.

PLATE 35 (FIG. 1).—C. PLUMOSA.

Cocos nucifera, the coco-nut of commerce, is grown extensively in the Northern parts of our State, where good fruits are developed, but, although odd specimens are to be met with in some of our local gardens,

we are too far away from the tropics to expect them to mature nuts. We have several growing in pots, which it is intended to plant out when of suitable size. The following are growing in the open in these gardens: *C. plumosa, C. flexuosa, C. coronata, C. Romanzoffiana, C. Yatay, C. odorata, and C. Weddelliana.*

Plate 36 (Fig. 2).—C. coronata.

The first four mentioned are very similar in habit; the first being grown in thousands about Brisbane. They are easily grown, seemingly being not particular as to soil or situation, although on fairly free soil the best results are obtained. Their rapid growth is an important point in their favour, as is also the absence of spines, a great drawback to

many showy palms. Being shallow rooters, the various kinds of Cocos may be safely transplanted, even when quite large, if ordinary care is observed in the operation, and a time chosen other than when the young leaves are in a sappy condition.

C. plumosa, the Feather Palm, is shown in Fig. 1. It has very long leaves of a dark green, the segments being more scattered than those of

PLATE 37 (FIG. 3).—C. ROMANZOFFIANA.

the others. Both *C. flexuosa* and *C. coronata* (Fig. 2), have dense, handsome foliage, which arches most gracefully, and is of a pleasing light green. *C. Romanzoffiana* (Fig. 3) is a tall, slender-stemmed palm, with long leaves, which are elegantly curved. *Cocos Yatay* (Fig. 4),

the Wine Palm, is quite distinct in appearance to the foregoing. It has long leaves of an ash-grey colour, and which arch beautifully. It takes many years in attaining a stem, and for this reason makes an excellent subject for lawn decoration.

C. Weddelliana is the most elegant species of the genus, the segments being placed regularly on each side and along nearly the whole length of the leaf. Very few plants are met with here in the open, but

PLATE 38 (FIG. 4).—C. YATAY.

for pot culture it is in great demand. Our plant has seeded during the past two years, and from which several young plants have been raised.

In raising plants of Cocos, and in fact any palms, care should be taken to sow only seed from the best trees, for, like most plants, the best results are obtained by careful selection, several types being noticeable even among the common *Cocos plumosa*.

PLATE 39 (FIG. 5).—C. WEDDELLIANA.

NOTE.—On page 183 of last month's (March) Journal the names under Plates 28 and 29 were unfortunately transposed. (Plates reprinted below.)

Livistona australis.

Archontophœnix Alexandræ.

PLATES 28 AND 29.—PALMS IN BOTANIC GARDENS.

Entomology.

INSECTS TRAPPED IN OLEANDER BLOSSOMS.

By E. JARVIS, Assistant Government Entomologist.

Last November the editor of our "Agricultural Journal" kindly drew my attention to some oleander flowers he had received from Dalby, which, curiously enough, contained flies that appeared to have been entrapped.

Being interested in the matter, I paid an early visit to Wickham Park to procure, if possible, additional specimens, and in about ten minutes was fortunate in finding a dozen such blossoms on a large oleander bush, some of which contained two or more captured flies.

Unlike the Droseras and other well-known insectivorous plants, oleanders are not specially adapted for ensnaring or assimilating insects, the former action in this instance being accidental, and evidently due to the remarkable structure and position of the stamens in these flowers.

If we take an oleander bloom and carefully pull off the petals, we shall see five stamens (S) arranged in the form of an acute triangle, as shown in the above sketch, and shall notice that along the sides of each run two firm-looking rods (R) with sharp incurved ends, and that these rods practically block the spaces between the stamens except near their bases, leaving only five apertures (A) through which an insect could get at the honey.

It follows, therefore, that it would be impossible for a large fly to reach the nectary without thrusting its proboscis through one of these openings, and, moreover, that, owing to the base of the corolla being tubular in shape, the insect would be compelled to assume an almost vertical position between the petals, and be unable to reach the honey without bending the end of its proboscis. A fly finds little difficulty, however, in forcing its fleshy trunk through one of these apertures, but cannot withdraw it so easily, as during the action this delicate organ of suction is very likely to slide up between two stamens into a narrower space, and so get jammed under one of the hooks shown at (H).

When this occurs, the oral sucker, which terminates the proboscis, and is larger than the jammed portion or haustellum, forms a sort of key, which makes it impossible for the unfortunate fly to escape, whilst its pulls and struggles only make matters worse by forcing the trunk higher up into a still more confined space.

Insect-eating plants sometimes crush or kill their victims with more or less promptitude, but a fly caught in an oleander flower, being uninjured in any way, is doomed to die slowly of starvation, or be eaten piecemeal by ants.

An examination of these captured insects showed that many of them had greatly stretched or almost wrenched out their trunks whilst endeavouring to get free.

All the specimens observed were flies of varying sizes belonging to the family Muscidæ.

PLATE 40.

1. Oleander flower torn open, showing entrapped flies (magnified about three times).
2. Centre of same flower more highly magnified.
3. Diagrammatic sketch of position of stamens.

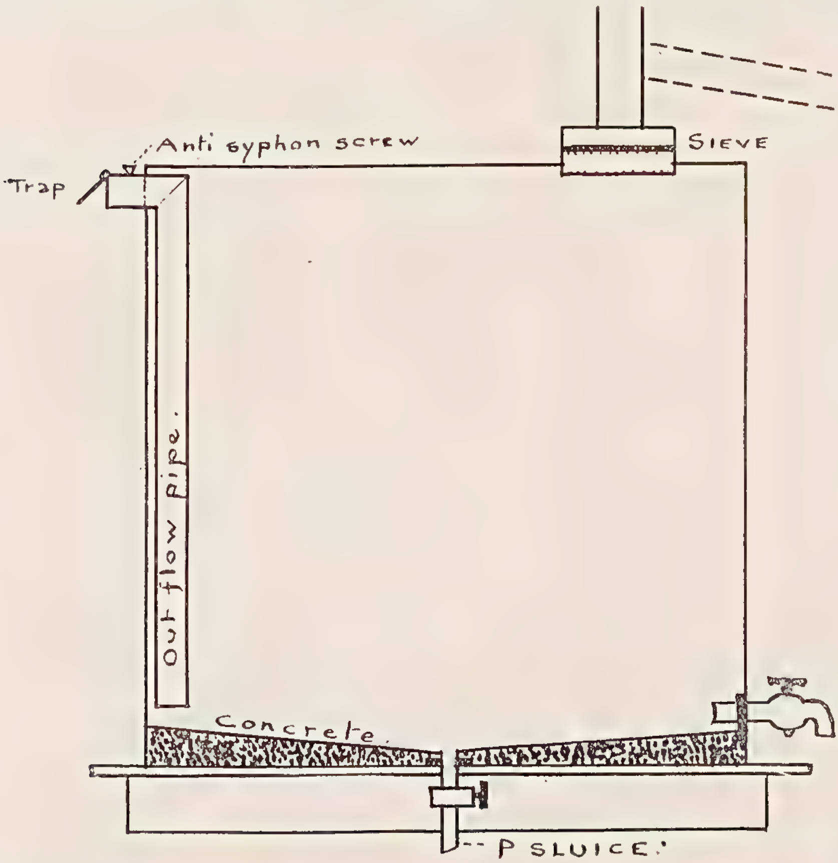
General Notes.

MOSQUITO AND DIRT-PROOF TANK.

Mr. W. E. MOLLE, Southport, writes on this subject—

I have read an amount of correspondence and reports in the daily Press concerning the methods and means by which our Health Department is destroying the mosquito pest.

I wish to place before you a plan of a house tank for conserving rain water which, in my opinion, will guarantee pure water, proof against



mosquitoes, frogs, and also a means of getting away the putrid matter which is found in the bottom of nearly every tank that has not been cleaned for twelve or more months.

Last year I purchased a house with which were several old galvanised tanks. These supplied the drinking water to the previous owner. Needless to say, he did not trouble to filter before using.

The mosquitoes were very much in evidence, and the tanks being worthless I immediately dismantled them and found, to my horror, that

2½ in. of the most evil-smelling mud was on the bottoms, and in each tank there were millions of mosquito larvæ.

Immediately I interested myself in planning a tank that would be free from the evils mentioned, and the cost of which would be within the means of every person desirous of a healthy home. I estimate that the improvements suggested would not cost 15s. to apply these ideas to any ordinary tank now in use.

My plan is to carry the overflow pipe *O* inside the tank down to within 4 in. of the bottom. The outlet shows on plan a dropper trap *T* hinged so as to flap and stop frogs from entering.

In carrying the pipe *O* down inside my aim is to retain the kerosene from being flushed away by the first storm; also, that the stagnant water at the bottom of the tank will pass away and the fresh rain water and kerosene will be retained above.

By adopting this plan, one has simply to charge the tank, and the oil, once placed inside, will remain there until it is evaporated.

The sieve *S* over the manhole must be fixed so that the water inside has no possible chance of rising to within 2 in. of its bottom. By keeping this sieve well up, frogs and other spawn have little chance of getting in and fouling the water, even should no oil be in the tank.

The bottom of the tank, marked *C*, will be concreted with a light aggregate such as cinders and cement to 3 in. up the sides of the tank, and then brought down with a gradual slope to drain the filth into the sluice pipe *P*; the concrete to receive two coats of a good impervious preservative.

The sluice tap *P* can be opened at any time, and the tank then becomes once more clean.

I would suggest two coats of cement and boiled linseed oil to the inside of the tank, and three coats of refrigerating paint to the outside. This would lengthen the life of the iron and keep the water at least 10 degrees cooler in the summer months.

Owing to the collection on the roof of a house (brought by the wind) of horse droppings and other filth, every inflow pipe should be disconnected for a short period during a spell of dry weather, and the first shower allowed to run away, whereas, now, it is allowed to pass into the tank, carrying all germs which are collected and stored for the thirsty children.

A small air hole in the top of the outflow pipe will guard against the pipe acting as a syphon (should it be carried down or connected with other tanks on a lower level).

CARBON BISULPHIDE.

"The Agricultural Journal of the Companhia de Moçambique" has the following useful information on the value of carbon bisulphide:—

This chemical is chiefly known on account of its use against weevil, which is so often found in stored maize and rice. In order to encourage the use of this valuable insecticide, the following notes have been pre-

pared from "Farmers' Bulletin No. 145," issued by the United States Department of Agriculture, in the hope that they may be useful to farmers and others living in this territory:—

Carbon bisulphide is a colourless watery liquid, which is one-fourth heavier than water. It is very volatile, evaporating with great rapidity when freely exposed to the air. The rapidity of evaporation depends mainly upon the area of the surface and the temperature of the air. Water will float on the top of carbon bisulphide just as paraffin floats upon water. In a general way it is correct to say that carbon bisulphide is applicable only where its vapour can be more or less confined. It is especially useful in dealing with insects which cannot be reached by poisoning their food or by spraying. The vapour must be confined in order to maintain a sufficient proportion of it in the atmosphere to prove fatal to insect life. It tends most strongly to spread outward and downward on account of its weight, and though it will gradually work upward its greatest density will be at the lowest levels; 1 lb. of carbon bisulphide is usually employed to each 1,000 cubic feet of space treated, whether for insects in buildings or in the ground. This amount gives an atmosphere of 1 part of carbon bisulphide to 90 parts of air, which is fatal to insect life in a short time. Where the atmosphere cannot be absolutely confined and the vapour may escape, two to four times the above amount may be necessary. In an atmosphere of 1 part carbon bisulphide to 90 parts of air, all insects perish in a few seconds; while in an atmosphere of 1 part carbon bisulphide to 254 of air, 1¼ hours are required for their destruction. The same result is, therefore, obtained by a small proportion of vapour acting through a long time as by a large proportion acting for a short time.

Destruction of Ants.—By this means ants also may be destroyed. One or more holes are made in the nest with an iron bar 1 or 2 ft. deep, and 1 or 2 oz. of carbon bisulphide are poured into each hole. The holes must then be immediately stopped up. A wet blanket put over the nest will help to confine the fumes. It may also be used for mole crickets living below ground.

Treatment of Stored Products.—Agricultural products are often stored in large quantities, and after a time become badly infested with insects. Beans, peas, maize, rice, wheat, tobacco, &c., &c., may all be affected. All buildings to be treated should be made as air-tight as possible, and the dishes to hold the liquid should be placed high above the floor. Shallow tin pans or plates make good evaporating dishes. The larger the evaporating area the better. There should be 1 square foot of evaporating surface to every 25 square feet of floor area, and each square foot of evaporating surface should receive from ½ lb. to 1 lb. of the liquid. When all the dishes have been filled, the place should be locked up for at least 24 hours. Thorough ventilation must be given for one or two hours before the building is again used. The vapour disappears rapidly in the open air, and after one hour there will be ordinarily no danger of entering a building which has been treated.

Seeds.—For the destruction of insects attacking seeds nothing equals carbon bisulphide. The seed to be treated should be placed in barrels,

bins, or rooms, care being taken to have the receptacle tight round the sides and bottom. In such cases carbon bisulphide is generally applied at the rate of 1 to 1½ lb. to each 1,000 cubic feet of space, which is the capacity of a room 10 ft. each way. A barrel would require more in proportion unless it were very tight. Heavy blankets or oilcloth may be used to cover small bins or barrels. The receptacle can be tightly closed for 24 to 36 hours, with perfect assurance that the germinating power of the seed will not be injured. The United States Department of Agriculture conducted experiments with carbon bisulphide upon 54 varieties of seeds. They were exposed to an atmosphere saturated with carbon bisulphide vapour for 48 hours. Under this extreme treatment, the severity of which would never be equalled in practice, the majority showed no injury. The seed of the grass family appeared more tender than others, and some suffered seriously. Those varieties injured in the first trial were treated again, but exposed for only 24 hours to a saturated atmosphere. The injury was markedly decreased in all cases. Experiments were also made upon grain in bulk, using 1 lb of liquid to 100 bushels of grain, the exposure lasting for 24 hours. In this case no difference could be detected even in the most delicate seeds.

Effect Upon Foodstuffs.—The opinion of those who have used this insecticide in mills, stores, &c., is that the vapour has no ill effect upon food. In fact no foodstuff has yet been found to be injured by exposure to carbon bisulphide vapour. By an annual application of carbon bisulphide to all mills, stores, &c., where grain and foodstuffs are kept, much, if not all, injury by insects would be avoided.

CROCODILE OR ALLIGATOR?*

In North Queensland and Papua, whenever the subject of conversation happens to be the great saurian, it is usually spoken of as the alligator, and someone is sure to ask, "What is the difference between the alligator and the crocodile?" The reply generally is: "Alligators frequent salt-water rivers and estuaries, and the crocodile is only found in fresh-water rivers and lagoons," as, for instance, in the big lagoons on Carpentaria Downs, where the so-called crocodiles are numerous and harmless to human beings. We have ourselves proved these latter to be harmless, having swum many times in the said lagoons while these reptiles were moving about not far away.

Now, we have a description of the two classes of saurian from Sir William MacGregor, who is an undoubted authority on the matter. The "Farm Bulletin" publishes the following definition as given by His Excellency to Mr. Behan, the well-known ostrich breeder:—

While entertaining Mr. Thos. Behan, of ostrich fame, at luncheon recently, Sir William MacGregor asked that gentleman if he knew the difference between a crocodile and an alligator? On Mr. Behan replying

* The name "alligator" is a corruption of the Spanish "el lagarto," a lizard. Crocodile is from the Greek "krokodeilos."—Ed. "Q.A.J."

that, although he had lived many years in the North, he did not, His Excellency had the following explanation of the difference typed out:—

Crocodile.

(1) 4th tooth in the mandible (lower jaw) canine, longer than the others and received into a notch in the upper jaw, so that it is visible externally when the mouth is closed.

(2) Hind feet completely webbed.

(3) Nasal bones form partly the ring of the nose.

Alligator.

(1) 4th tooth received into a pit in palatal surface of upper jaw, and concealed when mouth is shut.

(2) Hind feet incompletely webbed.

(3) Nasal bones take part in the anterior nostrils.

Differences.

1st, in the 4th canine tooth. 2nd, in the webs of the hind feet.

A GOOD PICKLE.

Chop green tomatoes, and sprinkle with salt; let stand overnight, and drain thoroughly. There should be 2 quarts after draining. Then add 2 quarts of chopped cabbage, 1 pint onions sliced thin, 1 pint chopped celery, 2 large red peppers chopped without seeds, ½-cup each of salt and mustard seed, 2 tablespoonfuls of celery seed, and vinegar to cover. Pack in a crock or jars, and cover. No cooking.

CATTLE-FEEDING INSTRUCTION TRAINS.

In the February issue of the journal we described the American method of instructing farmers in agriculture by means of instruction trains. From the "Live Stock Journal" we learn that the system is being extended in another direction, as stated below:—

A remarkable plan for encouraging the breeding and care of live stock has just been carried out through the agency of the Pittsburg, Cincinnati, Chicago, and St. Louis Railway Company. In the week ended on the 5th of October a special train conveying 12 lecturers stopped at 29 stations, at each of which professors from Purdue University, Indiana, delivered lectures on the subject named above, and exhibited specimens of animals of good and bad breeding respectively, with charts and specimens of dairy machines and utensils. Leaflets containing abstracts of the lectures were distributed. Seed-corn trains and dairy trains have been run for educational purposes during the last two or three years, and the Iowa Beef Producers' Association has arranged for a cattle-feeding train to be run through the State in the course of the present autumn. Further, a cattle-feeding expert is employed by the association to travel among farmers, suggesting improvement in their methods of feeding cattle when he sees the need of it.

COMPREHENSIVE CATALOGUE OF QUEENSLAND PLANTS.

The latest botanical work published by Mr. F. M. Bailey, C.M.G., &c., Government Botanist, under the above title, is worthy to rank amongst the best publications of its kind. Mr. Bailey has been indefatigable in collecting material for the catalogue for the past three years, and the nomenclature and uses of plants have been most carefully compiled. The book, which runs to 879 pages, is profusely illustrated with photographs, line drawings, and beautiful coloured plates, of which latter there are sixteen.

This publication should prove of great value to botanists throughout the world. It can be obtained through the Department of Agriculture and Stock. Price, Fifteen Shillings.

TREATING STUMPS WITH CHEMICALS.

Mr. E. T. BRUSE, Rosedale, Inkerman, sends us the following cutting from a New Zealand journal:—

Bore a hole with a 2-in. auger into the stump from the top; into this hole pour the following mixture (a pint for a big stump):—Nitric acid and sulphuric acid, equal parts. As soon as this is done the hole in the stump must be closed with a well-fitting wood plug. To do this well the plug should be dipped into liquid paraffin first. A stump so treated will be rotten in 30 days, roots and all; it will be a loose mass, and may be shovelled and spread over the land as manure.

Answers to Correspondents.

UTILISING CARCASSES FOR MANURE.

W. J. BECK, Ipswich—

(1.) Carcasses are not very suitable for manuring cultivated land, but good results have been obtained with fruit trees planted where carcasses were buried.

(2.) Lime would not help in making carcasses ready for distribution. The only proper method would be by artificial drying and crushing to obtain a manure like meatworks manure.

LINE-BREEDING—RED NATAL GRASS.

GEO. H. DORWARD, Nundah—

1. Mating heifer with sire. This is not "line breeding." It is incestuous or in-and-in breeding. The former practice signifies the mating together of animals of the same line of descent, but avoiding close relationship. By this means uniformity of type is secured, without impairing constitutional vigour. Such mating as sire and daughter is, however, dangerous, and in nine cases out of ten will result in a weed, if nothing worse. Shorthorns are less susceptible to the evil effects of in-and-in breeding than are other breeds, and, in fact, their distinctive characters have been secured by this very process. But it is decidedly not a method for the ordinary commercial breeder.

2. Red Natal grass is a useless weed. Rhodes grass is one of the best and most adaptable of fodder grasses.

DISEASE ON FRUIT TREES, &c.

G. WARD, Wondai—

The specimens submitted are infested with the Brown Soft Scale, *Lecanium longulum,* and fumagine (sooty fungus). Such plants as ferns, palms, grape vines, and many other plants are subject to attack, and the pests are more persistent when the vitality of the plants has been weakened by improper cultivation and uncongenial environment.

The best of all curative methods is good cultivation and fumigation by cyanide gas. If the plants are so situated that the gas treatment cannot be accomplished, the following formula used as a spray is very effective. Two or more applications may be required at intervals of three weeks:—

To one kerosene tin of water add 2 or 3 ounces of common or soft soap and boil. Whilst the water is boiling, slowly add 1 pint of kerosene, and keep stirring for a few minutes. When thoroughly emulsified, add sufficient starch (previously mixed like mustard) so as not to clog the nozzle of the spray pump. The mixture will eventually peel off, bringing the dead scales and fumagine with it.

ONIONS AND LUCERNE.

P. PETERSON, Nambour—

1. Good varieties of onions for the North Coast District are: Brown Spanish, an early and productive variety; Brown and Yellow Globe, these have good keeping qualities; Mammoth Silver King, mild and delicate. For exhibition purposes, try White Flat Mammoth Tripoli. Sow in April in rich, sandy loam, well drained, a soil that will not cake.

2. April is the best time for sowing lucerne, as weeds will then not be making much growth, and the young plants will have time to get into the three-leaf stage before the setting in of frosts in June, July, and August.

PIG-FEEDING—WHAT IS A BROOD MARE?

INQUIRER—Pittsworth.

1. The breeding of pigs is a business, and the production of pork and bacon is another rather different business. A farmer had better to stick to one or the other. Your query supplies one important reason. Growing pigs, fattening pigs, and breeding sows require different foods and treatment for the best results. It is too much to expect a sow to build up a litter out of a bulky watery diet like mangels. Her reproductive powers are being taxed, and she should not at the same time be required to expend so much energy in digestion. The food, moreover, should be of a more "building" nature than those mentioned. Separated milk, pollard with a proportion of bran, a run on a lucerne patch, and an occasional service of roots in moderation, should result in a strong, healthy litter. Such a diet contains the necessary mineral elements, which should not require to be added to as suggested. A little sulphur, however, is not out of place once in a while.

2. Even among the old country societies, some indefiniteness frequently attaches to this question. Outside of the class of three-year-old fillies, a female is either a brood mare or a yeld (or dry) mare. A common standard for a brood mare is one which has a foal at foot, had a foal in the season of showing, or had a foal at some time, and had been stinted in the season of showing. This agrees with your views of the position.

LIVE AND DRESSED WEIGHT OF A LAMB.

"LAMB," Miva Siding—

Fifty-four pounds at 13 weeks indicates a good lamb. As the lamb has made only fourteen pounds since, it is evident that you have not had proper feed to finish it off. Condition has given place to growth, and the lamb will not now handle so well. In raising lambs for sale, the aim should be to have a first draft for disposal straight from the mothers, to dress about 30 lb., say, in sixteen weeks, at the same time making provision of fresh green feed to carry forward the balance quickly to profitable weights. Much, of course, depends on the class of country, prices, and other local considerations, in deciding what to go in for and how to proceed. To estimate dressed weights of lambs, a good rule to follow is to halve the live weight and deduct 2 lb. for fat and shrinkage. Your lamb should thus dress 32 lb.

ASPHALTE.

A FARMER, Finch Hatton—

Asphaltes are combinations of bitumen and calcareous matter. They are sometimes found in Nature, and sometimes are artificially formed, but natural asphaltes are superior to those formed artificially, owing to the better blending of the materials. You apparently wish to make an asphalte which you can use for floors of outbuildings, walks, &c.

The natural asphalte can be bought as Seyssel asphalt or Trinidad asphalte, but it is expensive. A combination of ground limestone and boiled tar in the proportion of 80 per cent. of stone and 20 per cent. of tar, thoroughly well mixed together, and laid down while hot, and rammed or rolled, will make a fairly good floor. In the absence of ground limestone, slaked lime may be mixed with sand and boiling tar (boiled so as to become thick), and laid down while hot, and rolled or rammed, or rolled after dusting over with some fine sand or calcareous (limy) earth. No artificial combination, however, will equal the natural asphalte. Bitumen costs about £10 per ton in Sydney.

SPRAYING WEEDS.

W. F. D., Tweed Heads—

Any poisonous spray which will kill weeds will also kill the plants amongst which they grow. Besides this, the spray poisons the soil, which will bear no crop for several months afterwards, or until the poison is leached out by heavy rains. There is no weed destroyer we know of that is non-poisonous to all plant life, except the solution of copper sulphate and sulphate of iron used in the "Strawson Charlock Spray." This spray is used at the rate of 50 to 75 gallons of a 2 or 3 per cent. solution per acre. It effectually destroys charlock, and has even a beneficial effect on a wheat, oats, barley, tares, or bean crop, in that it increases the yield. But we understand that this spray is only effective on the young, tender charlock, and will not destroy other weeds without injury to crop and soil.

The Markets.

PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR MARCH, 1913.

Article.		March. Prices.
Bacon, Pineapple	lb.	9d. to 10½d.
Bran	ton	£5 15s.
Butter	cwt.	96s.
Chaff, Mixed	ton	£5 to £5 5s.
Chaff, Oaten (Victorian)	"	£6 15s.
Chaff, Oaten (Local)	"	...
Chaff, Lucerne	"	£5
Chaff, Wheaten	"	£3 10s.
Cheese	lb.	6d.
Flour	ton	£9
Hay, Oaten (Victorian)	"	£8
Hay, Lucerne	"	£3 10s.
Honey	lb.	2¾d. to 3d.
Maize	bush.	3s. 8½d. to 3s. 9d.
Oats	"	4s. to 4s. 3d.
Pollard	ton	£5 15s.
Potatoes	"	£8 10s. to £9 10s.
Potatoes, Sweet	cwt.	2s. 6d. to 3s.
Pumpkins	ton	£2 to £2 10s.
Wheat, Milling	bush.	3s. to 3s. 6d.
Onions	ton	£10
Hams	lb.	1s.
Eggs	doz.	1s. 2d. to 1s. 5d.
Fowls	pair	2s. 6d. to 4s.
Geese	"	6s. 6d.
Ducks, English	"	2s. 6d. to 3s.
Ducks, Muscovy	"	3s. to 5s.
Turkeys (Hens)	"	7s. to 9s.
Turkeys (Gobblers)	"	10s. to 17s.

SOUTHERN FRUIT MARKETS.

Apples (Choice—local), per gin case	2s. 6d. to 10s.
Apples (American), per gin case	9s. to 11s.
Apples (Cooking), per gin case	3s. 6d. to 6s.
Apricots, per half-gin case	...
Bananas (Fiji), G.M., per case	14s. to 14s. 6d.
Bananas (Fiji), G.M., per bunch	4s. to 9s.
Bananas (Queensland), per bunch	2s. to 4s.
Bananas (Queensland), per case	6s. to 9s.
Cherries, per 12-lb. box	...
Cocoanuts, per dozen	2s. 6d. to 3s.
Lemons (local), per gin case	5s. to 10s.
Lemons (Italian), per case	12s. to 13s. 6d.
Mandarins (Emperor), per case	...
Mangoes, per bushel case	...
Nectarines, per case	...
Oranges (Navel), per double case	22s. 6d.
Oranges (other), per case	4s. to 10s.
Papaw Apples, per bushel case	4s to 5s.
Passion Fruit, per half-case	6s. to 9s.
Peaches, per half-case	3s. 6d. to 7s. 6d.

SOUTHERN FRUIT MARKETS—*continued.*

Article.	MARCH. Prices.
Peanuts, per lb.	5d. to 6d.
Pears, per gin case	7s. to 8s.
Persimmons, per half-case	2s. to 4s. 6d.
Pineapples (Queensland), common, per case	4s. to 7s.
Pineapples (Queensland), Ripley's, per case	7s. to 8s.
Pineapples (Queensland), Queen's, per case	7s. to 8s.
Plums, per half-case	6s. to 7s.
Quinces, per gin case	5s.
Rockmelons (Queensland), per half case	...
Tomatoes, per half case	1s. 3d. to 4s.
Cucumbers (Local), per bushel case	2s. 6d. to 4s.
Watermelons (Queensland), per dozen	2s. to 6s.

PRICES OF FRUIT—TURBOT STREET MARKETS.

Article.	MARCH. Prices.
Apples (Eating), per case	6s. to 10s.
Apples (Cooking), per case	5s. to 8s.
Apples (American)	...
Bananas (Cavendish), per dozen	2d. to 3d.
Bananas (Sugar), per dozen	1½d. to 3d.
Custard Apples, per case	4s. to 4s. 6d.
Grapes, per lb.	3d. to 5d.
Lemons, per case	8s. to 9s.
Lemons (Italian), per case	...
Mandarins, per case	...
Mangoes, per case	3s. to 4s.
Nectarines, per case	...
Oranges (Navel), per case	...
Oranges (other), per case	...
Papaw Apples, per case	1s. 6d. to 3s.
Passion Fruit, per case	5s. to 6s. 9d.
Peaches, per quarter-case	2s. to 4s. 6d.
Peanuts, per lb.	3d. to 4d.
Persimmons, per quarter-case	2s. to 3s.
Pineapples (Ripley), per dozen	2s. to 4s.
Pineapples (Rough), per dozen	1s. to 3s.
Pineapples (Smooth), per dozen	1s. 6d. to 3s. 6d.
Plums, per case	...
Rockmelons, per doz.	...
Tomatoes, per quarter-case	1s. to 3s. 7d.
Watermelons, per dozen	...

TOP PRICES, ENOGGERA YARDS, FEBRUARY, 1913.

Animal.	FEBRUARY. Prices.
Bullocks	£8 2s. 6d. to £9 5s.
Cows	£6 17s. 6d. to £8
Merino Wethers	18s. 6d.
Crossbred Wethers	19s.
Merino Ewes	15s. 9d.
Crossbred Ewes	17s. 6d.
Lambs	17s.
Pigs (Porkers)	...

Farm and Garden Notes for May.

Field.—During this month the principal work in the field will be the sowing of wheat, barley, oats, rye, and vetches. There is no time to lose now in this work. Potatoes should be hilled up. Cut tobacco. The last of the cotton crop should now be picked, the bushes being stripped daily after the dew has evaporated. Messrs. Joyce Brothers, of Ipswich, are buyers of seed cotton, so that a sure means of disposing of the crop is available. Every effort should be made to ensure feed for stock during the winter, by utilising all kinds of green fodder, in the form of ensilage or hay. Those who own dairy stock will be wise to lay down permanent grasses suitable to the climate and to their particular district and soil. A few acres of artificial grass will support a surprisingly large number of cattle or sheep in proportion to acreage. Couch grass in the West, as has been proved at Barcaldine, will carry 10 or 12 sheep to the acre. Coffee-picking should now be in full swing, and the berries pulped as they are picked. Strawberries may be transplanted. The best varieties are Pink's Prolific, Aurie, Marguerite, Hautbois, and Trollope's Victoria. The Aurie is the earliest, and the Marguerite next. In some localities strawberry planting is finished in March, and the plants bear their first fruits in August. In others, fruit may be gathered in July, and the picking does not end until January.

Kitchen Garden.—Onions which have been planted in seed beds may now be transplanted. The ground should have been thoroughly cleaned, pulverised, and rolled previous to transplanting. Onions may still be sown in the open on clean ground. In favourable weather plant out cabbages, cauliflowers, lettuce, leeks, beetroot, endive, &c. Sowings may also be made of all these, as well as of peas, broad beans, kohl-rabi, radishes, spinach, turnips, parsnips, and carrots. Dig and prepare beds for asparagus.

Flower Garden.—Transplanting and planting may be carried out simultaneously during this month in showery weather; the plants will thus be fully established before the early frosts set in. Camellias and gardenias may be safely transplanted, also such soft-wooded plants as verbenas, petunias, penstemons, &c. Cut back and prune all trees and shrubs ready for digging. Dahlia roots should be taken up and placed in a shady situation out of doors. Plant bulbs, such as anemones, ranunculus, snowflakes, freesias, ixias, iris, narcissus, &c. Tulips and hyacinths may be tried, but success in this climate is very doubtful. All shades and screens may now be removed to enable the plants to get the full benefit of the air. Fork in the mulching, and keep the walks free from weeds. Clip hedges and edgings.

Orchard Notes for May.

THE SOUTHERN COAST DISTRICTS.

The advice given respecting the handling and marketing of citrus fruits in the last two numbers of this journal applies with equal force to this and the following months. Do not think that you can give the fruit too much care and attention; it is not possible, as the better they are handled, graded, and packed the better they will carry, and the better the price they will realise.

Continue to pay careful attention to specking, and fight the blue mould fungus everywhere. Don't let mouldy fruit lie about on the ground, hang on the trees, or be left in the packing-shed, but destroy it by burning. Keep a careful lookout for fruit fly, and sweat the fruit carefully before packing. If this is done, there will be little fear of the fruit going bad in transit or being condemned on its arrival at Southern markets. Where the orchard has not been already cleaned up, do so now, and get it in good order for winter. Surface working is all that is required, just sufficient to keep moisture in the soil; keep down undergrowth, and prevent the packing of the surface soil by trampling it down when gathering the fruit.

Keeping the orchard clean in this manner enables any fallen fruit to be easily seen and gathered, and it need hardly be stated, what has been mentioned many times before, that diseased fruit should on no account be allowed to lie about and rot on the ground, as this is one of the most frequent causes of the spreading of many fruit pests.

May is a good month to plant citrus trees, as if the ground is in good order they get established before the winter, and are ready to make a vigorous growth in spring.

Don't plant the trees, however, till the land is ready, as nothing is gained thereby, but very frequently the trees are seriously injured, as they only make a poor start, become stunted in their growth, and are soon overtaken by trees planted later, that are set out under more favourable conditions. The land must be thoroughly sweet, and in a good state of tilth—that is to say, deeply worked, and worked down fine. If this has been done, it will probably be moist enough for planting; but should there have been a dry spell, then when the hole has been dug and the tree set therein, and the roots just covered with fine top soil, 4 to 8 gallons of water should be given to each tree, allowed to soak in, and then covered with dry soil to fill up the hole. In sound, free sandy loams that are naturally scrub, holes may be dug and the trees planted before the whole of the ground is brought into a state of perfect tilth. It is, however, better to do the work prior to planting, as it can then be done in the most thorough manner; but if this is not found possible, then the sooner it is done after planting the better. If the land has been thoroughly prepared, there is no necessity to dig big holes, and in no

case should the holes be dug deeper than the surrounding ground either is or is to be worked. The hole need only be big enough to allow the roots to be well spread out, and deep enough to set the tree at the same depth at which it stood when in the nursery. Plant worked trees 24 to 25 ft. apart each way, and seedlings at least 30 ft. apart each way.

Towards the end of the month cover pineapples when there is any danger of frost; dry blady grass or bush hay is the best covering. Keep the pines clean and well worked—first, to retain moisture; and, secondly, to prevent injury from frost—as a patch of weedy pines will get badly frosted when a clean patch alongside will escape without any serious injury.

Slowly acting manures—such as meatworks manure when coarse, boiling-down refuse, farm manure, or composts—may be applied during the month, as they will become slowly available for the trees' use when the spring growth takes place; but quickly-acting manures should not be applied now.

THE TROPICAL COAST DISTRICTS.

May is a somewhat slack month for fruit—pines, papaws, and granadillas are not in full fruit, the autumn crop of citrus fruit is over, and the spring crop only half-grown. Watch the young citrus fruit for Maori, and when it makes its appearance spray with the sulphide of soda wash. Keep the orchard clean, as from now till the early summer there will not be much rain, and if the orchard is allowed to run wild—viz., unworked and dirty—it is very apt to dry out, and both the trees and fruit will suffer in consequence.

Bananas should be kept well worked for this reason, and, though the fly should be slackening off, every care must still be taken to prevent any infested fruit being sent to the Southern markets.

Citrus fruits can be planted during the month, the remarks *re* this under the heading of the Southern Coast Districts being equally applicable here.

THE SOUTHERN AND CENTRAL TABLELANDS.

Get land ready for the planting of new deciduous orchards, as, although there is no necessity to plant so early, it is always well to have the land in order, so as to be ready to plant at any time that the weather is suitable. The pruning of deciduous trees can commence towards the end of the month in the Stanthorpe district, and be continued during June and July. It is too early for pruning elsewhere, and too early for grapes, as a general rule. Keep the orchard clean, particularly in the drier parts. In the Stanthorpe district grow a crop of blue or grey field peas or a crop of vetches between the trees in the older orchards as a green manure. The crop to be grown as a green manure should have the soil well prepared before planting, and should be manured with not less than 4 cwt. of phosphatic manure, such as Thomas phosphate or fine bone dust, per acre; the crop to be ploughed in when in the flowering

stage. The granitic soils are naturally deficient in organic matter and nitrogen as well as phosphoric acid, and this ploughing in of a green crop that has been manured with a phosphatic manure will have a marked effect on the soil.

Lemons will be ready for gathering in the Roma, Barcaldine, and other districts. They should be cut from the trees, sweated, and cured down, when they will keep for months and be equal in quality to the imported Italian or Californian fruit. If allowed to remain on the trees, the fruit becomes over-large and coarse, and is only of value for peel. Only the finest fruit should be cured; the larger fruit, where the skin is thicker, is even better for peel, especially if the skin is bright and free from blemish; scaly fruit—scabby, warty, or otherwise unsightly fruit—is not suitable for peel, and trees producing such require cleaning or working over with a better variety, possibly both.

The remarks *re* other citrus fruit and the work of the orchard generally, made when dealing with the Coast Districts, apply equally well here, especially as regards handling the crop and keeping down pests.

TIMES OF SUNRISE AND SUNSET AT BRISBANE—1913.

Date.	January.		February.		March.		April.	
	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	4·57	6·46	5 21	6·42	5·40	6·20	5·57	5·46
2	4·58	6·46	5·22	6·41	5·41	6·19	5·58	5·45
3	4·58	6·46	5·22	6·41	5·42	6·18	5·58	5·44
4	4·59	6·46	5·23	6·40	5·42	6·17	5·59	5·43
5	4·59	6·46	5·24	6·40	5·43	6·16	5·59	5·42
6	5·0	6·47	5·25	6·39	5·44	6·15	6·0	5·41
7	5·1	6·47	5·25	6·38	5 44	6·14	6·0	5·40
8	5·2	6·47	5·26	6·38	5·45	6·13	6·1	5·39
9	5·2	6·47	5·27	6·37	5·45	6·12	6·1	5·38
10	5·3	6·47	5·28	6·36	5·46	6·11	6·2	5·37
11	5·4	6·47	5·28	6·36	5·46	6·10	6·2	5·35
12	5·5	6·47	5·29	6·35	5·47	6·9	6·3	5·34
13	5·5	6·47	5·30	6·34	5·48	6·7	6·3	5·33
14	5·6	6·47	5·30	6·33	5·48	6·6	6·4	5·32
15	5·7	6·47	5·31	6 33	5·49	6·5	6·4	5·31
16	5·8	6·47	5·32	6 32	5·49	6·4	6·5	5·30
17	5·9	6·47	5·33	6·31	5·50	6·3	6·6	5 29
18	5·9	6·47	5·33	6 30	5·50	6·2	6·6	5·29
19	5·10	6·46	5·34	6·29	5·51	6·1	6·7	5·28
20	5·11	6·46	5·35	6 28	5·51	6·0	6·7	5·27
21	5·12	6·46	5·35	6·28	5·52	5·59	6·8	5·26
22	5·12	6·46	5 36	6·27	5·52	5·57	6·8	5·25
23	5·13	6·46	5·37	6·26	5·53	5·56	6·9	5·24
24	5·14	6·45	5·37	6·25	5·53	5·55	6 9	5·23
25	5·15	6·45	5·38	6·24	5·54	5·54	6·10	5·22
26	5·16	6·45	5·38	6·23	5·54	5·53	6·10	5·21
27	5·17	6·44	5·39	6·22	5·55	5·52	6·11	5·20
28	5·17	6·44	5·40	6 21	5·55	5·51	6·12	5·19
29	5·18	6·43	...	...	5·56	5·50	6·12	5·18
30	5·19	6·43	...	...	5·56	5·48	6·13	5·17
31	5·20	6·42	...	...	5·57	5·47	...	...

PHASES OF THE MOON.

		H.	M.
7 Jan.	● New Moon	8	28 p.m.
16 „	☾ First Quarter	2	2 a.m.
23 „	○ Full Moon	1	40 „
29 „	☽ Last Quarter	5	34 p.m.
6 Feb.	● New Moon	3	22 p.m.
14 „	☾ First Quarter	6	34 „
21 „	○ Full Moon	12	3 „
28 „	☽ Last Quarter	7	15 a.m.
8 Mar.	● New Moon	10	22 a.m.
16 „	☾ First Quarter	6	58 „
22 „	○ Full Moon	9	56 p.m.
29 „	☽ Last Quarter	10	58 „
7 Apr.	● New Moon	3	48 a.m.
14 „	☾ First Quarter	3	39 p.m.
21 „	○ Full Moon	7	33 a.m.
28 „	☽ Last Quarter	4	9 p.m.

QUEENSLAND AGRICULTURAL JOURNAL

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Agriculture.

HINTS TO NEW SETTLERS—No. 5.

BY THE EDITOR.

In districts infested by kangaroos, wallabies, and paddymelons, the two-rail fence offers no obstacle to their incursions into the cultivated land. Consequently a fence must be constructed which will be what is usually known as "wallaby-proof." This can easily be done by means of wire netting, as used in the Western rabbit fences, but we started on the assumption that the settlers to whom these notes are specially addressed are a long way from the distributing centres, and they will find it far cheaper to adopt the means at hand than to go to the expense of wire netting on which freight and cartage have to be paid. In the timbered country those means are represented by palings. There are three ways of setting up palings. One is by nailing them to a two-rail fence; another by sinking them 6 in. in the ground and nailing the top to a one-rail fence. A third way, and a very useful one to the man who is in a hurry to fence, is to set up ordinary split or round posts at distances of 10 to 12 ft. apart. Connect these by two slack wires. Insert the head of the paling, and, before pushing it down to the ground, give it a twist, turning it completely over. It is now gripped between the two wires. Then push it down and fix it in the ground. Do the same with subsequent palings. As each one is separately gripped by the twisted wire, they cannot be pushed asunder. As no nails are

required, a smart man can set up a large number of panels in a day. Now, supposing, still, that we are in timbered country, we have to select trees for palings which are straight in the grain and which will allow of the running off of a paling 4 in. or 5 in. wide, ¼ in thick, and from 4 ft. to 6 ft. long. One of the trees which fill this bill is the stringy bark. Many of these trees will admit of the running out of palings not more than the eighth of an inch thick, but twice that thickness is better. Ironbark palings are the best, and, with a good free-running tree, there is no more trouble in getting them than in case of stringy bark. Having found a suitable tree, and felled it, take off a log of the length required for the palings. Then proceed in the same way as already described for billeting a log for slabs or rails, with this exception—that the billet is much narrower than for those materials. Having prepared the billets, place a small billet or log within a few inches of the remaining part of the tree on the ground, leaving sufficient space to insert the end of the billet between it and the log, leaving it at an angle of about 45 degrees. Then take the paling or shingle throw and use the mallet in the same way as you would for shingles; only here, you have to follow up the throw, when once entered, with the handle of the mallet, sliding it along as you wrench at the throw. Palings are better taken off singly, instead of halving and quartering the billet. When you have a bit of practice at this, you can reckon on running out from 300 to 400 palings per day, which means enough to do about 20 panels of the fence. Having thus got the palings, set them up as directed above.

We will now suppose that the new settler has selected sheep country, which usually means plain land or land lightly timbered—no big trees to split—only mulga, or brigalow, or coolibah down by the creeks. Here is where wire fencing comes in. It all depends upon what animals are in your neighbourhood which might be liable to break through your defences what number of wires are required, and whether you should use barbed or plain wires. My own opinion is decidedly against the use of barbed wire. Many valuable animals—horses, bulls, &c.—have been badly maimed by contact with barbed wire, and, even if they are not attempting to break through, often they are being driven between fences, and have their sides torn by the barbs, the innocent suffering for the guilty. With well-stretched plain wires, even sheep and pigs can be kept out; whilst the larger animals will not even attempt to get through—not even emus.

Well, suppose you are in a sheep district. An essential matter, especially if you are a sheep farmer, and one which, as Mr. W. G. Brown, Sheep and Wool Expert, tells us, amply repays initial cost, is the making of every fence on the farm sheep-proof. With Merinos that is not difficult, the ordinary 6 or 7 wire fence being quite sufficient. But as a farmer may have to deal with British breeds and their crosses, he will have to consider other than wire fences, for these last animals are great wanderers, and very much more enterprising than Merinos. Wherever a Lincoln or a Leicester can find an opening for his head and shoulders, he will, sooner or later, thrust his body, and either enter or escape from the paddock, as the case may be, taking with him the rest of the flock

with which he has been running. Fences against this determined class of sheep should (says Mr. Brown) be wire-netted; and a good new fence netted for sheep and dogs will cost from £40 to £73 per mile.

In country where there is little large timber, but abundance of ti-tree saplings, a fairly useful fence may be made of the saplings placed upright as palings. These will last some time until circumstances warrant the erection of a more permanent fence.

[TO BE CONTINUED.]

GROWING SWEET POTATOES.

The sweet potato adapts itself so readily to the Queensland climate, and yields such heavy crops where the soil is suitable, the rainfall sufficient, and when due care has been exercised in the prevention of disease, that it is surprising to note the absence of this excellent table tuber on many of the farms. This may partly be accounted for by the deportation of the kanaka, a large portion of whose rations consisted of sweet potatoes, and further by the sudden appearance of disease in the shape of a weevil, which was observed for the first time in Australia in June, 1886, at Hemmant, on Mr. A. Miles's farm. On this being made public at a meeting of the East Moreton Farmers' Association, Mr. H. Tryon, Government Entomologist and Vegetable Pathologist, prepared a special report on the occurrence, and advised "the destruction of all affected tubers and a change of crop." Unfortunately, these extreme measures were not resorted to, with the result that in 1888 the weevil had asserted its presence by the destruction of sweet-potato crops in the entire neighbourhood of Brisbane. It next found its way to Mackay, the Herbert River, and other Northern sugar districts; and in 1900 was destroying the crops on the Johnstone River.

An exhaustive paper on the subject by Mr. Tryon will be found in Vol. VII., p. 176 (August, 1900), of this journal.

The United States Department of Agriculture issued, in December, 1912, a very instructive bulletin (No. 520) by W. R. Beattie, Assistant Horticulturist, Bureau of Plant Industry. In it we find precisely the same advice to sweet-potato growers as that given by Mr. Tryon twelve years previously. Mr. Beattie writes:—

> The proper keeping of sweet potatoes requires that they be—(1) well grown and thoroughly ripened; (2) free from disease; (3) carefully handled in digging and storing; and (4) stored in a dry, well-ventilated place, where proper temperatures can be maintained.
>
> The first essential is met by growing the sweet potatoes on land adapted to the crop, and in giving good cultivation. The second essential—freedom from disease—requires the careful selection of seed potatoes, the use of new soil in the plant bed each year, and the following of a crop rotation in the field, so that sweet potatoes will not be planted on the same land oftener than once in three years.

One of the best ways to keep the crop free from disease is to grow the seed stock from vine cuttings planted on land where sweet potatoes have not been grown for several years. Diseased and decayed sweet potatoes should not be thrown in manure or on land where the crop is to be grown. A safer plan would be to burn all infected potatoes and refuse.

The best land for sweet potatoes is a rich, free, sandy loam; and where a big crop has been raised on such land, the inclination is to replant on the same land in the following year, and this is precisely what should not be done. Here, in Queensland, sweet potatoes are propagated by vine cuttings, and, before obtaining them from any particular farm, the intending planter can easily ascertain if the late crop had developed disease, and, if so, his best course is to let those vines severely alone and try farther afield. It is very easy to introduce a disease, but very hard and often impossible to eradicate it, as every farmer and fruit-grower has reason to know. Common sense then says:—"Effect a change of seed or plant, and plant none which have been grown on a diseased field."

ORGANISATION AMONGST FARMERS.

Fifteen years ago we advocated in this journal the organisation of farmers—in other words, union amongst farmers, quite irrespective of political union. What is Union? "Union is strength." "United we stand"; divided we may not fall, but may have a hard, uphill row to hoe. Over and over again these trite aphorisms have been demonstrated. By union, we do not imply combinations of men of any particular calling which bring them into antagonism with other men, which impel them to defy authority and to set themselves up as arbiters of the destinies of a country. The union we advocate is that which binds men of different trades and callings to work together, not only for their own benefit, but for the common welfare of the community at large. Such unions are productive of great blessings to a country, and amongst no classes of the community is a union more desirable than amongst the tillers of the soil.

Almost since the inception of agriculture as an industry in this State—that is to say, for about fifty years—associations of farmers, graziers, fruit-growers, and others have been formed whose object at the outset has been to benefit their members by effecting, as a body, what would be impossible or, at least, difficult of attainment by each individual separately.

The old East Moreton Farmers' Association, which many old colonists will remember, approached nearest to the ideal union. The members—all farmers and rural workers generally—met regularly once a month, papers were read and discussed, exhibits of various kinds of produce were laid before the meetings, and emulation was stimulated by the successes of individual members. Ploughing matches were regularly held, and the interest taken in the meetings was such as to create a bond of

real union which resulted in raising the status of farmers and their employees and instilling into their minds ideas calculated to bring the agricultural industry to its proper level amongst the other growing industries of the State (or Colony in those days).

For some years afterwards, although unions under the name of societies were found in all the principal agricultural centres, it was regrettable to observe that the work of these societies tended mainly to one end—a show.

Agricultural shows are very excellent things, as they serve to bring under the notice of all interested in Agriculture, and amongst intending settlers in any particular district, the resources of those districts, and hence render good service in pushing them ahead. But we always held that there are greater issues involved in an agricultural union than the mere holding of a show, and happily this has been realised by the societies, which, to-day, lay themselves out not only to hold shows, but also to educate farmers in the various factors which contribute to successful farming, dairying, stock-raising, &c. Valuable aid to this end has been afforded by the Department of Agriculture and Stock, which has long since obtained the services of the best qualified men—experts—in the various fields of agriculture, in which term we include all branches of the science (for agriculture to-day is recognised as a true science).

The labours of these scientists—especially of the chemist, the entomologist, and the bacteriologist—have been productive of good results since the farmers, sugar-planters, coffee-growers, and stock-raisers have been regularly organised into what we may designate as unions, otherwise progress associations, with a regular meeting-place in each district, with live committees and secretaries.

In former days there were practically few diseases to cope with either by the general farmer, the wheat or fruit-grower, or the stock-owner. Fruit fly, orange-piercing moths, cattle ticks, tuberculosis, pumpkin beetles, prickly pear, *et hæc genera omnia*, were absolutely unknown, but gradually these pests were introduced and rapidly multiplied to such an extent that the call for scientific aid was heard from all parts of the country. Obviously it was impossible for a scientific officer of the Department to visit individual farms, orchards, and grazing properties; but his labours were simplified by the organisation of all engaged in rural industries into societies, before whom his investigations and deductions have been placed, and disseminated by leaflet and pamphlet throughout every district in the State. Thus, the Society, Union, or Association—call it by what name we please—has become a body, speaking for hundreds of farmers in each district. This being so, we say that a farmer who to-day does not belong to a union is an isolated unit, who has forgotten to insure himself against adversity, and the district without a union is one that offers few attractions either to new-comers or to the men already in it.

There is also another view to be taken of organisation amongst farmers, and that is in their combination for the purchase of seed,

plants, &c., in quantity, instead of each individual farmer purchasing his own requirements—a system which naturally results in his paying more for every farm requisite than would be the case if half-a-hundred farmers pooled their money and purchased at wholesale prices in bulk. We can give a very good proof of the advantage of combination for this purpose, which we ourselves engineered many years ago in our own farming district near Brisbane. During one year seed potatoes were rather scarce and consequently high-priced in Brisbane—something like £8 per ton. A meeting was called of a number of farmers, and it was decided that on the arrival of a brig from New Zealand with seed potatoes, two or three of us should make an offer for a large quantity. The vessel arrived, and we interviewed the captain, with the result that we bought all the seed potatoes we required at £2 10s. per ton, the only stipulation being that the farmers should pay cash, and fill their own bags in the ship's hold, the potatoes being in bulk. This proved to be an advantage, as the farmers had the opportunity of selecting nothing but good tubers, whereas, had they purchased them in the ordinary way from stores in the city, they would have had to take the chance of a considerable quantity in the bags being rotten. This is only one example of what co-operation did for the farmers who were wise enough to co-operate with their neighbours.

Since the foregoing was written, we are pleased to learn from the "Brisbane Courier" of 27th March, that a big movement has been initiated at a Conference of the Queensland Farmers' Union to give practical effect to a scheme for co-operation amongst farmers:—

"At that Conference there was an almost unanimous expression of opinion to the effect that the best way to deal with the present difficulties in the marketing of farm produce was by co-operation among the farmers themselves, on as large a scale as possible. As soon as the Conference had ended, prominent members of the union set to work to evolve a practical application of the opinions expressed at the Conference. It was decided to make the scheme as nearly universal as possible, while not interfering with such existing co-operative institutions as should not choose to amalgamate with the new organisation, which has now come definitely into existence under the style of 'The Associated Farmers of Queensland, Limited.' It held its first business meeting of shareholders in the Courier Building yesterday (26th March) for the purpose of confirming the articles of association of the company. Subsequently a meeting of the board of directors was held at the same place, when there were present—Messrs. John Shearer (Oakey), J. W. Dunlop (Beaudesert), A. P. Jones (Clifton), G. E. J. Chaseley (Kingaroy), E. Winks (Fassifern), and H. J. Kipping (Nambour).

"The following officers were elected:—Chairman of directors, Mr. J. Shearer; vice-chairman, Mr. J. W. Dunlop; managing director, Mr. A. P. Jones.

"The managing director was empowered to appoint a staff and complete the other preliminaries for the carrying out of the business of the company. Arrangements were made for the allotment of shares

already applied for, and for the collection of allotment moneys. Important business, which was placed in the hands of the company by the Queensland Farmers' Union, was arranged for, and it was announced that a very large amount of general business had been promised as soon as the company was in a position to begin operations. The various directors, elected from areas outside the Darling Downs, thanked the Darling Downs representatives for the support which they had given to the outlying districts in this effort.

"Recently Mr. Jones (managing director) sent a wire conveying the fraternal greetings of the Queensland Associated Farmers to a meeting of the West Australian Farmers and Settlers' Association at Perth, at which there were 2,000 members present. The secretary of the gathering, in replying, stated that his association looked forward to the day when all the farmers of the Commonwealth would be banded together for 'practical, social, and political purposes.'"

DEPARTMENTAL GENERAL EXHIBIT AT AGRICULTURAL SHOWS.

At the request of various agricultural societies, a general or travelling exhibit is being shown at the principal centres in the Southern and Central portions of the State.

This exhibit, prepared at Head Office from products grown at the College and State Farms, together with material from the various demonstration plots, is intended to take the place of individual displays from those institutions.

Not only will this new departure relieve the College and State Farms of much work in preparing exhibits and attending shows, but a combined display is likely to prove of a much higher educational value. That this fact has already been noted at the centres is attested by the comments of both the public and the Press.

The range of products shown is most comprehensive, and would be practically impossible in any other State of the Commonwealth.

A special feature is made of the experimental and research work carried out by the Department. This embraces the results of the wheat demonstration plots initiated along the Western and South-Western Lines. These have been grouped in such a manner as to show at a glance the effect of soil and climatic conditions in relation to growth and yield.

Illustrations in regard to the research work carried out at Roma State Farm in the production of new wheats suitable to different districts are shown on screens.

Maize varieties are on view from the Departmental stud-breeding plots in the various corn-growing districts. Those sorts are of a heavy yielding purebred type, and are being raised for distribution purposes. There is also a large collection of samples of fodder crops, which are shown in the form of hay, chaff, and silage; the latter having been preserved by various methods, such as stack, pit, and overground silos.

Although extensive areas are being laid down under introduced grasses—principally Rhodes—the preserving and propagating of the best of our indigenous varieties which have remarkable powers of drought resistance, as well as a high nutritious value, are receiving little attention. A collection has been made of the best of our native sorts for the purpose of analysis. Specimens of these are on view, with labels attached giving much useful information in regard to both their habit of growth and feeding value.

Included in the exhibit is a fine trophy of Wool obtained from different localities as well as from the purebred Merino flock at Hermitage State Farm, near Warwick; also, mohair, cotton, and some thirty varieties of fibres.

The Tobacco industry is represented by samples of cigar, cigarette, and pipe leaf grown in the Bowen, Inglewood, and Texas districts respectively.

With a view to showing what can be done with our fruits during a glut, and to prove that it is possible to export them oversea, the Department has placed in cold storage a number of fruits, which will be drawn upon for the purpose of this exhibit at the various shows, and labelled as to the length of time it has been kept in cold storage.

The display also includes Sugar, Coffee, Tea, Cocoa, Rubbers, and other products of tropical agriculture. This portion is of much interest to school children, and in several centres demonstrations are being arranged for the day following the show.

STACK SILAGE DEMONSTRATIONS.

The Department of Agriculture and Stock, to popularise the benefits to be derived from silos, last season made arrangements in certain districts with farmers to grow suitable crops, with the promise that, when they were ready, officers of the Department would attend and show how a very cheap silo could be constructed pending the time when, experience having proved the advantages to the dairy farmer, more permanent structures would be erected. In two places—Baking Board and Mundubbera—the crops having matured for silage purposes, arrangements were made by the owner of the land on which the crops were grown for the surrounding farmers, who desired, to attend on a certain day to witness the operations which were conducted by Mr. Quodling, the Agricultural Inspector, an extract from whose report upon the two demonstrations is as follows:—

"Following on immediately after the show, steps were taken to get into direct touch with farmers interested in the matter, and Departmental officers visited several centres and made arrangements to establish demonstration plots, with the object of subsequently stacking the fodder for conversion into silage. Seed of maize, sorghums, and cowpeas (sufficient for 10 acres at each centre) was supplied to certain farmers residing in the vicinity of Wallumbilla, Jackson, Baking Board, Warra,

Degilbo, and Mundubbera, on the understanding that it should be sown in drills on well-cultivated land and the crop properly cared for. On the 26th ultimo a demonstration was given at Mr. F. M. Bradhurst's Peak View Farm, at Baking Board, on the Western Line. Here maize and sorghum were sown in alternate rows. The crop received a considerable check from dry weather, and only grew to about 6 ft. in height. An ordinary reaper and binder was used for cutting it, and answered the purpose very well.

"About fifty persons were present, some farmers and their wives showing their interest in the matter by travelling a distance of 15 miles.

"Following on after a practical demonstration, an explanatory address was tendered and a discussion encouraged on points of interest. Directions were left to ensure a satisfactory completion of the stack. Too much credit cannot be given to Mr. and Mrs. Bradhurst and family (Victorians), who spared neither time nor effort in providing refreshments and in looking after the wants of the public. Full appreciation was given expression to by representative men of the gathering, who also commended the work and efforts of the Department. There is every reason to expect that many farmers will be disposed to take up the matter of conserving fodder in this way in the near future.

"In explanation of the conditions ruling in the locality, it may be stated that, apart from the light sandy loam soils in the vicinity of Chinchilla, where a good deal of dairying is now being carried on by settlers, who, for the most part, have been established for some years, there are extensive areas of ironbark, ridgy country round Baking Board, and this gives place in turn to large tracts of brigalow scrub, where the soil is for the most part of good quality. Peak View Farm is admirably situated on a superior section of land, rendered fertile naturally by the accumulations of vegetable matter from the low enveloping ridges; and here some admirable pioneering work has been put in, and the systematic reclamation and grassing of each cleared section after felling and burning off is a standing advertisement for the pluck and whole-hearted enthusiasm of the owners.

"Dairying is taking a good hold of the locality, and is rendered possible by the successful establishment of Rhodes grass throughout the brigalow scrub country. Prickly pear is common to much of the Chinchilla district; but where good land exists and the ultimate successful subjugation of the pest is assured, the settlers are tackling the problem manfully. The winters are sufficiently prolonged to indicate that a farmer' profits can only be upheld by paying attention to the feeding and care of his dairy cows.

"*Mundubbera.*—A demonstration on similar lines to the above was carried on at Messrs. Fairweather Bros.' farm, on the Auburn River, on the 3rd instant. Some thirty people were present, many representative farmers and persons coming long distances.

"The two principal crops here were sorghum, Folger's Early, and Early Orange Cane, also maize. These were sown on well-prepared sandy loam soil, where there was evidence also of patches of a heavier

type of surface soil carrying more clay in its composition; the above represented the first crop on the land. Bounteous rains have been experienced and the growth of both crops remarkably good, the former reaching from 10 to 12 ft. in height, and the latter running on an average of from 12 to 14 ft., and these excellent growths were obtained in eleven weeks from the day the seed was sown. Twenty tons of fodder to the acre should easily be harvested, and it is questionable whether heavier crops are obtainable elsewhere in a given time.

"Every facility was afforded by the Messrs. Fairweather Bros. to make the demonstration a success. A similar programme was followed here to the one adopted at Baking Board, with this exception—That, as a heavy storm had been experienced recently, it prevented the use of any machine. Cane knives were resorted to for cutting down the maize, this crop being the first operated on. The district is one of the State's pioneering centres.

"Dairying is beginning to take on and likely to expand more so than anything else for a time, and, judging by the heavy yields of green fodder obtainable in a good season on the sandy loam soil found on the river frontages, success is to be looked for when advantage is taken of their latent productivity."

USE OF DYNAMITE IN FARMING.

J. S. W. Strachan, Wooloowin, writes:—

"In an article in the April number of the 'Queensland Agricultural Journal,' by Mr. Wilcox, on the use of dynamite in Hawaii, it is stated that the hole for receiving the dynamite cannot be drilled in our heavy soil by the use of an ordinary earth auger. That is quite true; but I have been able to bore holes in the heaviest soils by using a screw auger, such as carpenters use for boring wood.

"I got a blacksmith to cut the shank and weld a piece of iron rod between the ends, making the auger 4½ ft. long—that is the depth at which the dynamite does the most useful work.

"Mr. Wilcox advises the use of an iron bar 1½ in. diameter to be driven by a 16-lb. hammer to a depth of 2½ ft. My experience is that a depth of 4½ ft. is much better. I think that there would be great difficulty in drawing an iron bar 1½ in. dia. if it were driven to a depth of 4½ ft. There is no trouble with the screw auger.

"Very often the screw point gets broken off, making the auger useless for boring wood, and the carpenter is willing to sell it very cheap; the screw point is not required for soil boring. But even if the auger is bought new from the ironmonger, it is a much cheaper tool than a 1½ in. iron bar and a 16-lb. hammer, and certainly more easily used.

"I have bored holes 40 ft. deep with such an auger, using ½-in. iron pipe to lengthen the shank."

Pastoral.

THE UNITED KINGDOM—THE WORLD'S MARKET.

"There are now," says the "Live Stock Journal" (January, 1913), "about 46,000,000 men, women, and children in the United Kingdom. In the last five years of the nineteenth century, the average annual outlay on food was £365,000,000, or 6d. per head per day—£9 2s. 6d. annually per head of the population. The market value of all the food consumed was almost £300,500,000, or about £7 10s. per head of the population. The outlay on food in the present year is likely to exceed £500,000,000, provided peace prevails; and it may reach £552,000,000, or £12 per head of the population. This outlay is exclusive of ale, porter, wine, spirits, cider, and other beverages; but it includes milk, which is a true food. The outlay on meat, poultry, eggs, milk, butter, and cheese is likely to be over £287,000,000, and may reach £300,000,000. Owing to the greatly increased cost of shipbuilding and the upward tendency of all expenses in connection with the importation of produce, and, further, owing to a marked reduction in the quantity of fat stock that can be spared for exportation from North America, it is certain that our home production will command remunerative prices for some years to come."

Very interesting are Mr. R. Rew's notes on the

LIVE STOCK ON AGRICULTURAL HOLDINGS IN THE UNITED KINGDOM IN JUNE, 1912.

The estimated numbers and values of horses, cattle, sheep, and pigs of all ages on agricultural holdings on the above date were:—

Animals.	Numbers.	£	s.	d.	£
Horses, ponies, and foals ..	2,165,114 ..	22	0	0 ..	47,633,000
Cattle and calves	11,909,470 ..	10	15	0 ..	128,027,000
Sheep and lambs	28,951,470 ..	1	10	0 ..	43,427,000
Pigs of all ages	3,992,440 ..	2	0	0 ..	7,985,000
					£227,072,000

The total amount of capital employed in farming is now about £400,000,000. The gross increase ought to have been £200,000,000, but, owing to the long drought in 1911 and the deluge in 1912, the revenue has fallen considerably below this amount.

The area of the British Isles is 121,027 square miles. The area of Queensland is 670,500 square miles, or about five times the area of the United Kingdom, and the population about 606,000, or about one-seventieth of that of the latter.

THE AREA UNDER CULTIVATION IN QUEENSLAND

in 1912 was 779,800 acres, with, in addition, 166,175 acres under permanent artificially sown grasses, making a total of 945,975 acres. The value of all crops was estimated at £3,185,792.

The estimated numbers and approximate values of horses, cattle, sheep, and pigs of all ages on pastoral and agricultural holdings in 1912 were:—

Animals.	Numbers.	£ s. d.	£
Horses	618,954 ..	10 0 0 ..	6,189,540
Cattle	5,073,201 ..	8 0 0 ..	40,000,000
Sheep	20,740,981 ..	0 15 0 ..	15,555,736
Pigs	173,902 ..	1 0 0 ..	173,902
			£61,919,278

The total amount of capital employed in farming (including dairying and sugar-planting and machinery) cannot be given as a whole, owing to the very different conditions, as compared with Great Britain, under which lands are held either in fee-simple, leasehold, conditional purchases, clearing, artesian bores, dams, &c., &c.

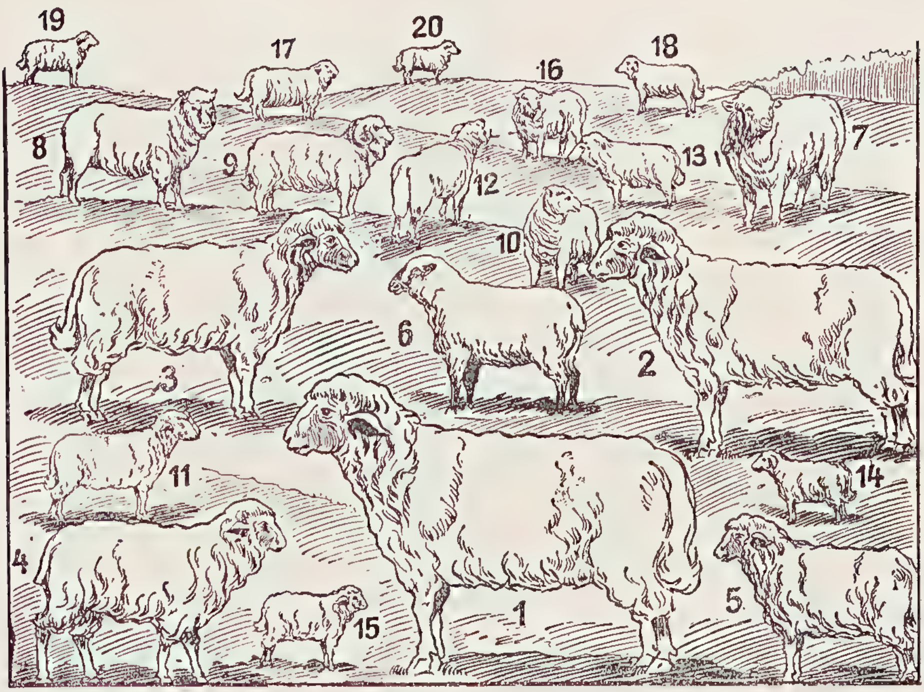
The value of machinery and implements employed in farming and dairying, irrigation, &c., is set down by the Registrar-General at £1,462,683. In the sugar industry, including sugar and juice mills and refineries, the machinery employed is valued at £2,078,945, exclusive of land and premises, £418,492.

SHEEP-RAISING THROUGHOUT THE WORLD.

In the issue of this journal for October, 1912, we published a short article taken from the Berlin journal, "Die Ernaehrung der Pflanze," showing the progress of pig-breeding in the principal countries of the world during the previous ten years. From the same source we take the accompanying illustration and letterpress, showing the progress of sheep-raising throughout the wolrd:—

"Unfortunately," says the above journal, "with the progress of intensive agriculture in almost all countries, the sheepbreeding industry is retrograding, although there are a few exceptions, as, for instance, in England, where it is convincingly shown that such a state of affairs should not exist; on the contrary, that, given the introduction of pure breeds, sheep-raising can be profitably carried on without too much outlay on management. Sheep-breeding in Germany has to-day fallen to a point which thirty years ago would have appeared incredible; and if (excepting Russia), England, France, and the States of Southern Europe, now considerably surpass us, still, with them also the sheep industry is gradually drifting towards comparative insignificance. In reality, it is only in Australasia that sheep-breeding is still in full progress, for even Argentina and the United States have considerably reduced the numbers of this class of stock."

[With respect to Queensland, we have altered the figures given from 20,331,838 to 20,740,981, which was the number of sheep in the State on 30th June, 1912. To-day, they probably reach 21,000,000.—Ed. "Q.A.J."]



1.	Argentine	67,211,754.	11.	Victoria	12,882,663.
2.	United States ..	52,262,000.	12.	Cape of Good Hope	11,796,790.
3.	New South Wales	45,560,969.	13.	Italy	11,162,926.
4.	Great Britain ..	26,494,992.	14.	Algeria	9,042,302.
5.	Uruguay	26,286,296.	15.	Hungary	8,547,366.
6.	New Zealand ..	23,996,126.	16.	Bulgaria	8,130,997.
7.	British India ..	23,246,636.	17.	Germany	7,703,710.
8.	Queensland ..	20,740,981.	18.	Turkey in Europe	6,912,568.
9.	France	17,110,760.	19.	Roumania ..	5,655,444.
10.	Spain	15,725,882.	20.	Austria	4,928,016.

LAMBING PERCENTAGES.

By W. G. BROWN, Sheep and Wool Expert.

According to the latest figures I have been able to get ("Dalgety's Review," 1911), it is apparent that, while the wool-using population of the whole world has increased by 115 millions since 1895, the world's increase in sheep has been about 60 millions in the same period.

This will explain, adequately, the increased and increasing value of wool in the world's markets, and gives promise that the present level of values will be sustained, if not raised.

Australasia, Argentina, and possibly South Africa are the only countries which have not reached the limits of expansion in numbers of sheep, but it is safe to say that these places will never overtake the demand for wool. In Australia alone there is a shortage of 4 millions of sheep for 1912 as compared with 1911. It is certain that there will never be the enormous relative expansion in Australia as compared with the past fifty years. Local increase in population will act as a

check in greater and greater degree. Closely connected with the demand for wool is the demand for mutton and lamb, and sheep are now valuable. The old conditions—when a prime wether realised top price, 4s., and a fat bullock was sold at from 6s. to 8s. per cwt.—are gone for ever. It, therefore, behoves every breeder of sheep to take care of his lambs. There has been a great preventable waste of young life in the past, due to hurried and slipshod methods of marking, &c. Now that a lamb, at birth, has a potential value of 10s. or 11s. off shears if he live, increased attention must be paid to saving as many as possible to come to maturity. The ways of marking, &c., is not the purpose of this article. It is intended to discuss percentages of lambs in the annual drop and inquire if there are any means whereby such increase may be expanded. It is unnecessary to say that even 2 per cent. increase in the drop means a large amount of money in the aggregate.

In the course of thirty-five years' experience of sheep and wool in Queensland and other States, I have seen and heard of many methods of management of flocks at mating-time, and I desire to quote a case where 103½ per cent. (one drop) was the result of a procedure, which I shall detail, in a Western Merino flock in Queensland. I believe that 103½ per cent. is a record in Australia for a large number such as was involved in this case. A common percentage on the same station is over 90 per cent. in anything like a decent season. Here are the particulars:—The management had been for many years of the opinion that Autumn was the best period of the year for shearing; and at the time I speak of I was conducting shearing operations. Machines were used. Shearing began on the 12th March, a year or two after the Big Drought. There were about 31,000 ewes left on the place. When we started on these, the manager asked me in the morning how many I expected to shear per day, and I was able to tell him about 4,000. He was thus able to make provision, on that basis, for a supply of rams handy to the shed. The whole day's shearing was allowed to stand in the yards on each side of the shed; and at night, after the last count-out, the manager got from me the total count for each side of the board for the day. He then placed 3 per cent. of rams with the ewes in the yards; and the whole flock was left all night, driven away next morning, at sunrise, to a set of yards 7 or 8 miles away, left there for a night, and then sent out to their paddocks. I believe they were yarded once or twice again during the eight weeks the rams were left with the ewes.

The rams had been shorn in the preceding November, and so carried only four months' wool. They were of mixed ages, from 4-tooth to aged. The ewes were brought in fresh to the yards every night in numbers corresponding to my estimate of the numbers I expected to shear next day. This is an exact account of the method of mating.

In the first week of the following March I arrived at the station to start the shearing again, and learned from the manager that the drop of lambs for the year was 103½ per cent.—that is, from 31,000 ewes, there had fallen over 32,000 lambs; and, naturally, he was jubilant that he had outstripped all previous records for such a large number. I was pleased, too, for it meant a larger number to shear than I expected.

They were offered for sale, however, at 10s. each, and, to my disappointment, were inspected and purchased at that price in the wool. Over 31,000 were counted and delivered subsequently. A remarkable record, and I quote it to show what may be done by method and knowledge.

The conditions were such as obtain on every large holding in South-Western Queensland—large paddocks of well-matured mulga country.

To sum up these conditions:—

The rams were full of vigour and not carrying a heavy fleece, nor were they tired and bruised by recent shearing.

The ewes were in good condition, but tired and relaxed by the shearing operations, and they had a fairly long spell from lamb bearing and rearing, owing to the drought.

The time of year for mating was the Glorious Autumn of the West—warm days and cool nights.

The flock was yarded several times during the period of mating, and the total result was 103½ per cent. on 31,000 ewes.

I can vouch for the correctness of the return.

Another method of getting a big percentage was followed on a station in the same district. The total drop for the same year as the big percentage above detailed was 146 per cent.; but—not in one drop. There was a Summer and Winter lambing for the same ewes—80 per cent. at one period and 66 per cent for the second. As far as one could see at the time, the ewes did not suffer by the process of bearing two lambs in one year, yet a noticeable deterioration of the young stock could be perceived later on, and the method, after two or three years' trial, was abandoned. This was to be expected on physiological grounds.

A third method, which is common to a number of men who are not skilled sheep-masters, and obtains only among the smaller holders, is the method of allowing the rams to run with the ewes during the whole year.

The evils of this method may be summed up shortly:—

1st—When flies attack the sheep, it is probable that a number of ewes will be near lambing, and so cannot be handled without injury to both ewe and lamb.

2nd—A proportion of green lambs will lose their mothers by the frequent mustering to which they must necessarily be submitted.

3rd—A most uneven drop of lambs must be the result of such a practice.

4th—Shearing operations cannot be successfully conducted if a proportion of ewes cannot be mustered and shorn.

5th—Upon the whole a lower percentage of saved lambs for the year than if the rams had been excluded for, say, nine months.

6th—A very large relative proportion of poddies through the mother weaning off a sucking lamb if she gets in lamb again.

The above remarks apply to Merino sheep. A quite different set of circumstances apply to the farmer's sheep—*i.e.*, Long Wools; yet the principles are the same.

In the British breeds a common percentage in one drop is 120 to 130 per cent. For sixteen years (I learn from the Suffolk Downs Society Book for 1913) an average has been maintained of 133·12 per cent.; and I learn that in Britain most of the other breeds claim an equal fecundity. We should be able to do quite as well here on our smaller holdings and good climate; and in time, when sheep are better understood by the farmer in Queensland, we shall equal British records in our general percentages. It does not require much brains to see what an increase of 20 or 30 per cent. in our average drop would mean in solid cash, now that values are so high and seem so permanent.

SAWING TIMBER THE NEW WAY.

Mr. F. C. Krautz, Goombungee, sends us an illustration of a plant he is successfully working at his homestead.

It shows how a handy man can utilise the Oil Engine indispensable to the Farmer.

He says:—"Although I generally use an 8-h.p. New-Way Oil Engine for chaff-cutting, I find it is so easy to start that I can cut half a ton of

PLATE 41.

chaff while others are getting up speed, and the engine keeps so cool under a heavy load that it is simply marvellous. I now use it for saw-milling. For timber cutting it drives a 26-in. or 36-in. circular saw without any trouble, and runs out 500 to 800 superficial feet a day. I also use a vertical frame fitted with two vertical saws for splitting the logs, which this engine drives with ease."

Dairying.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

MILKING RECORDS OF COWS FOR MONTH OF MARCH, 1913.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Test.	Commercial Butter.	Remarks.
			Lb.	%	Lb.	
Lark ...	Ayrshire	22 Jan., 1913	999	4·2	47·0	
Madame Melba	Holstein	2 Jan. ,,	1,080	3·8	45·73	
Daisy ...	,, ...	14 Feb. ,,	1,215	3·4	45·71	
Glen ...	Shorthorn ..	5 Sep., 1912	634	4·8	43·40	
Bluebelle ...	Jersey	2 Aug. ,,	533	5·2	32·55	
Queen Kate	Ayrshire	17 Feb., 1913	855	3·4	32·17	
Lavinia's Pride	,, ...	2 Feb. ,,	905	3·2	31·93	
Miss Lark ...	,, ...	12 Dec., 1912	659	4·3	31·78	
Conscience ...	,, ...	16 Feb., 1913	664	4·1	30·45	
Miss Melba	Holstein	22 Jan. ,,	926	2·8	30·43	
Lady Loch...	Ayrshire	10 Jan. ,,	635	4·2	29·87	
Miss Jean ...	,, ...	5 Mar. ,,	718	3·7	29·55	
Bella ...	,, ...	4 Dec., 1912	600	4·1	27·52	
Rosalie ...	,, ...	15 Aug. ,,	484	4·8	26·17	
Silver Nell ...	Shorthorn... ...	29 Oct. ,,	506	4·2	23·80	
Burton's Lily	,, ...	5 Oct. ,,	418	5·0	23·59	
Pauline ...	,, ...	7 Dec. ,,	586	3·6	23·44	
Sweet Meadows	Jersey	3 Sept. ,,	369	5·4	23·43	
Lonesome ...	Ayrshire	13 Dec. ,,	603	3·5	23·40	
Miss Edition	Jersey	13 Aug. ,,	401	5·1	23·10	
Lass ...	Ayrshire	30 Nov. ,,	523	3·7	21·52	

AN ENORMOUS PIG.

There has just been sold from the West Derby herd, at Liverpool, the celebrated Large White boar Wallace 14155, at the high figure of 100 guineas. This boar won many prizes in 1911 and 1912, and is regarded as the largest boar in England to-day. His measurements are as follow:—Length from between the ears to root of tail, straight across the back, 6 ft. 7 in.; length overall, from tip of nose to end of tail, 10 ft.; height at shoulder, 3 ft. 9 in. The sale of this boar has been effected by Messrs. Alfred Mansell and Co., Shrewsbury, for exportation to Russia.

Poultry.

REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, MARCH, 1913.

The ninth egg-laying competition finished on 31st March. T. Fanning wins the monthly prize with 121 eggs. A detailed report on the whole competition will be issued later. The following are the individual records :—

Competitors.	Breed.	March.	Total.
R. Burns	Black Orpingtons ...	106	1,534
T. Fanning	White Leghorns ...	121	1,491
J. R. Wilson	Do.	95	1,417
Range Poultry Farm	Do. (No. 1)	90	1,395
H. Tappenden	Do.	84	1,392
E. A. Smith	Do. (No. 2)	76	1,388
A. T. Coomber	Do.	63	1,381
J. Gosley	Do.	71	1,309
R. Burns	Silver-laced Wyandottes	99	1,304
Yangarella Poultry Farm	White Leghorns ...	83	1,303
Mrs. Sprengel	Do.	76	1,297
Mrs. Bieber	Brown Leghorns ...	68	1,268
A. R. Wooley	White Leghorns ...	58	1,267
J. Zahl	Do. (No. 1)	84	1,261
A. H. Padman, S.A.	Do.	98	1,248
Range Poultry Farm	Do. (No. 2)	103	1,241
E. A. Smith	Do. (No. 1)	66	1,234
H. Hammill, N.S.W.	Do.	102	1,204
W. D. Bradburne, N.S.W.	Do.	44	1,203
B. Holtorf	Do.	38	1,189
Cowan Bros., N.S.W.	Do. ...	36	1,184
J. Zahl	Do. (No. 2)	84	1,172
Mrs. Craig	Do.	77	1,168
J. Holmes	Do.	66	1,161
D. Grant	Do.	80	1,145
F. W. Cornish	Do.	19	1,071
J. F. Dalrymple, N.S.W.	Do.	75	1,058
Mrs. Dredge	Do.	63	1,050
R. Burns	Do.	50	1,011
W. W. Hay	Black Leghorns ...	14	968
Totals	...	2,189	37,344

CONCLUSION OF THE EGG-LAYING COMPETITION AT THE Q.A. COLLEGE, 1912-13.

The ninth egg-laying competition was brought to a close on 31st March, 1913. For this thirty-one entries had been received, but, owing to one withdrawal, the number of pens actually competing was thirty. These were made up as follows:—White Leghorns, 26 pens; Brown Leghorns, S.L. Wyandottes, Black Orpingtons, and Black Leghorns, 1 pen each—180 birds in all. The number of eggs laid during the twelve

months was 37,344, an average of 1,244·8 per pen, or nearly 207·5 per bird. The total value of the eggs laid was £174 18s. 8d., while the cost of food was £50 1s. 2d., thus leaving a profit, exclusive of labour, of £124 17s. 6d. over the cost of feeding, or, if prize money and entry fees (see balance-sheet) be included, £119 14s. 6d. on the whole competition. The birds were a splendid lot of layers, and nearly half of them were from new competitors or farmers. The great feature of the laying was the splendid performance of the Black Orpingtons; while the most unfortunate was the fact that two of Mr. Dalrymple's hens proved to be barren and did not lay an egg. The four remaining birds in this pen were fine layers, their record being 1,058 eggs in the twelve months, an average of 264·5 per hen. Particulars relating to this pen have already appeared in the reports for January and February last. The following are the prize-winners:—

		Eggs.	
1st.—R. Burns, Sladevale, Warwick	Black Orpingtons	1,534	£7 7s.
2nd.—T. Fanning, Ashgrove, Brisbane	White Leghorns	1,491	£4 4s.
3rd.—J. R. Wilson, Eudlo, N. C. Line	White Leghorns	1,417	£2 2s.

Monthly prizes of 10s. for largest number during each month:—

	Eggs.		Eggs.
April—A. H. Padman	118	Oct.—Yangarella Poultry Farm	173
May—W. D. Bradburne	125	Nov.—Mrs. G. Craig	160
June—J. Gosley	112	Dec.—Mrs. G. Craig	150
July—R. Burns	164	Jan.—Mrs. G. Craig	144
Aug.—R. Burns	172	Feb.—J. Zahl	136
Sept.—R. Burns	163	Mar.—T. Fanning	121

BROODIES.—One hundred and three broodies were recorded during the year, representing 41 birds and affecting 19 pens, the largest number from any one pen being 15. The breeds affected were—Black Orpingtons (2), S.L. Wyandottes (9), and White Leghorns (92).

FEEDING.—As in previous years, strict attention has been given to the feeding; this is essential where fowls are confined and everything has to be fed to them. We have not departed from our usual methods, as recorded in past years, except that, being short of pollard and bran, ground wheat was tried for a few days; for a short period, too, desiccated meat being unobtainable, green bone was used instead. Roughly speaking the morning meal consisted of bran and pollard in about equal proportions, more or less bran according to the flouriness of the pollard, with 1 quart of desiccated meat or 1½ lb. of Sunlight oilcake mixed therewith on alternate mornings; this was mixed into a crumbly mash with separated milk. At midday, chaffed green lucerne and a little soup meat, when available, were given. At night; good sound wheat, with good heavy plump oats once a week by way of variety. No maize was used during this competition. Seashell grit was always kept in the houses, and fresh clean water was supplied each morning. The houses were cleaned out once a week. The amount fed varied according to the birds' appetites; they were given as much as they would eat up eagerly without leaving any; this is a good rule to follow. The mortality was very light; only six birds died during the twelve months.

The following are the monthly and total records, and balance-sheet:—

Competitors.	Breed.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Totals.
R. Burns, Sladevale, Warwick	Black Orpingtons	20	97	105	164	172	163	161	155	146	118	127	106	1,534
T. Fanning, Ashgrove, Brisbane	White Leghorns	31	98	93	134	167	155	161	139	146	129	117	121	1,491
J. R. Wilson, Eudlo	Do.	43	41	67	144	159	147	155	152	147	137	130	95	1,417
Range Poultry Farm, Toowoomba	Do. (No. 1) ..	48	89	86	126	158	141	142	137	135	124	119	90	1,395
H. Tappenden, Maryborough	Do.	61	57	88	132	147	145	147	146	142	128	115	84	1,392
E. A. Smith, Paddington, Brisbane	Do. (No. 2) ...	58	79	81	125	153	147	157	134	133	126	119	76	1,388
A. T. Coomber, Bundaberg	Do.	75	87	87	124	151	141	149	136	143	118	107	63	1,381
J. Gosley, Childers...	Do.	50	119	112	126	142	139	143	126	114	87	80	71	1,309
R. Burns, Sladevale, Warwick	Silver-laced Wyandottes ..	30	68	72	127	148	141	137	127	128	110	117	99	1,304
Yangarella Poultry Farm, Indooroopilly ...	White Leghorns	56	40	61	131	158	152	173	137	118	99	95	83	1,303
Mrs. Sprengel, Boonah	Do.	4	41	68	130	132	144	162	157	142	126	113	76	1,297
Mrs. Bieber, Childers	Brown Leghorns	95	107	4	97	144	142	150	124	116	114	110	68	1,268
A. R. Wooley, Cairns	White Leghorns	37	112	89	130	144	135	135	113	122	109	83	58	1,267
J. Zahl, Boonah	Do. (No. 1) ...	0	24	88	140	145	138	129	120	131	126	136	84	1,261
A. H. Padman, Adelaide, S.A.	Do.	118	95	10	0	86	160	164	132	143	121	121	98	1,248
Range Poultry Farm, Toowoomba	Do. (No. 2) ...	7	35	37	121	134	144	149	139	131	120	121	103	1,241
E. A. Smith, Paddington, Brisbane	Do. (No. 1) ...	62	103	44	112	134	132	137	121	114	99	110	66	1,234
H. Hammill, Kogarah, N.S.W....	Do.	14	41	50	95	140	136	143	127	127	117	112	102	1,204
W. D. Bradburne, Bexley, N.S.W.	Do.	50	125	52	85	131	148	140	123	113	116	74	44	1,203
B. Holtorf, Beaudesert	Do.	66	96	10	85	129	139	150	138	132	117	89	38	1,189
Cowan Bros., Burwood, N.S.W.	Do.	23	65	95	107	128	145	140	127	126	104	88	36	1,184
J. Zahl, Boonah	Do. (No. 2) ...	0	2	57	125	146	137	151	125	130	109	106	64	1,172
Mrs. Craig, Miriam Vale	Do.	15	0	0	60	134	149	163	160	150	144	116	77	1,168
J. Holmes, Toowoomba	Do.	47	51	27	95	128	131	134	138	132	121	91	66	1,161
D. Grant, Boonah	Do.	0	18	25	111	129	150	163	136	119	101	113	80	1,145
P. W. Cornish, Toowoomba	Do.	21	20	21	55	135	154	157	145	132	119	93	19	1,071
J. F. Dalrymple, Bexley, N.S.W.	Do.	37	19	57	87	101	112	120	114	119	115	102	75	1,058
Mrs. Dredge, Bundaberg	Do.	47	82	22	31	128	125	125	118	111	99	99	63	1,050
R. Burns, Sladevale, Warwick	Do.	2	4	27	72	139	137	151	145	127	98	89	50	1,041
W. W. Hay, Warwick	Black Leghorns	35	28	20	75	138	110	138	126	121	78	55	14	968
	Totals	1,149	1,843	1,655	3,146	4,180	4,269	4,426	4,017	3,890	3,438	3,147	2,189	37,344

BALANCE-SHEET.

Receipts.

		£	s.	d.
Entry fees, 31 at 10s.		15	10	0
Eggs.—Dining Hall, 1,157·6/12 dozen		62	12	2
Orient S.S. Co., 1,954 6/12 dozen		111	6	6
		£189	8	8

Expenditure.

	£ s. d.	£	s.	d.
Prize money		19	13	0
Food.—Wheat, 34 Bags	26 10 6			
Pollard, 22 bags	7 12 6			
Bran, 19 bags	7 4 2			
Green bone, 1 cwt.	0 12 6			
Oilcake, 3 cwt.	1 11 0			
Oats, 3 bags	1 12 0			
Wheatmeal, 2 bags	1 0 0			
Desiccated meat, 3 cwt.	2 8 6			
Soup meat	0 10 0			
Green lucerne	1 0 0			
		50	1	2
Net Profit on Competition		119	14	6
		£189	8	8

TIMES OF SUNRISE AND SUNSET AT BRISBANE—1913.

Date.	May.		June.		July.		August.	
	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	6·13	5·16	6·30	5·0	6·39	5·3	6·30	5·18
2	6·14	5·16	6·31	5·0	6·39	5·4	6·30	5·19
3	6·14	5·15	6·31	5·0	6·39	5·4	6·29	5·19
4	6·15	5·14	6 32	5·0	6 39	5·4	6·29	5·20
5	6·15	5·13	6·32	5·0	6·39	5·5	6·28	5·20
6	6·16	5·13	6·33	5·0	6·39	5·5	6·27	5·21
7	6·16	5·12	6 33	5 0	6·39	5·6	6·26	5·21
8	6·17	5·11	6·33	4·59	6 39	5·6	6 26	5·22
9	6·18	5·10	6·34	4·59	6 39	5·7	6·25	5·22
10	6·18	5·10	6·34	4·59	6·39	5·7	6·24	5·23
11	6·19	5·9	6·35	4·59	6·39	5·7	6·23	5·23
12	6·19	5·8	6·35	4·59	6·38	5·8	6·22	5·24
13	6·20	5·8	6·35	4·59	6·38	5·8	6·22	5·24
14	6·20	5·7	6·36	4·59	6·38	5·9	6 21	5·25
15	6 21	5·7	6·36	5·0	6·38	5·9	6·20	5·25
16	6·22	5·6	6·37	5·0	6·37	5·10	6·19	5·26
17	6·22	5·6	6·37	5·0	6·37	5·10	6·18	5·26
18	6·23	5·5	6·37	5·0	6·37	5·11	6·17	5·27
19	6·23	5·5	6·37	5·0	6·37	5·11	6·16	5·27
20	6·24	5·4	6·37	5·0	6·36	5·12	6·15	5·28
21	6·25	5·4	6·38	5 0	6·36	5·12	6·14	5·28
22	6·25	5·3	6·38	5·0	6·36	5·13	6·13	5·29
23	6·26	5·3	6·38	5·1	6·35	5·13	6·12	5·30
24	6·26	5·3	6·38	5·1	6·35	5·14	6·11	5·31
25	6·27	5·2	6·39	5·1	6·34	5·14	6·10	5·31
26	6·27	5·2	6·39	5·1	6·34	5·15	6·9	5·31
27	6·28	5·2	6·39	5·2	6·33	5·15	6·8	5·32
28	6·28	5·1	6 39	5·2	6·33	5·16	6·7	5·32
29	6·29	5·1	6·39	5·2	6·32	5·16	6·6	5·32
30	6·29	5·1	6 39	5·3	6·32	5·17	6·5	5·33
31	6·30	5·0	...	...	6·31	5·17	6·4	5·33

Phases of the Moon.

			H. M.
6 May	●	New Moon	6 24 p.m.
13 „	☾	First Quarter	9 45 „
20 „	○	Full Moon	5 18 „
28 „	☽	Last Quarter	10 14 a.m.
5 June	●	New Moon	5 57 a.m.
12 „	☾	First Quarter	2 37 „
19 „	○	Full Moon	3 54 „
27 „	☽	Last Quarter	3 41 „
4 July	●	New Moon	3 6 p.m.
11 „	☾	First Quarter	7 37 a.m.
18 „	○	Full Moon	4 6 p.m.
26 „	☽	Last Quarter	7 59 „
2 Aug.	●	New Moon	10 58 p.m.
9 „	☾	First Quarter	2 3 „
17 „	○	Full Moon	6 27 a.m.
25 „	☽	Last Quarter	10 18 „

State Farms.

JAPANESE UPLAND RICE AT THE STATE NURSERY, KAMERUNGA.

Another small planting of the four varieties of Japanese Upland rice—viz., Oiran, Yakan, Kinzo, and Kaneka—sent up by the Department of Agriculture, was made on 1st November, 1912, and harvested on 1st March, 1913. Owing to very heavy rains, "including 16 in. in one day alone," a good deal of damage was done by heavy wash. However, there was sufficient left to show that all of these varieties gave good promise—the heads filled well, and the paddy was certainly equal to the original lot sent up. With regard to its fitness for "green feed," as the height was only 2 ft. 6 in., it would undoubtedly be more profitable to grow corn, sorghum, teosinte, guinea grass, &c., all of which would give much heavier crops. As a hay, Oiran, "which so far shows the finest straw," might prove useful in a district where it could be cured, but the weather here has been too wet to cure any green crop this year. Yakan proved the easiest to thresh, the grain coming off much easier than from the other three varieties.

SOMETHING LIKE A MAIZE FARM.

An interesting description of the largest maize farm in the world, owned by the Rankin family, is given by the American "Country Gentleman." The late Mr. David Rankin paid the last one pound note he possessed to the minister who married him in 1850, and 50 years later his income ran into millions, all earned by farming, while 39,900 acres of land in Missouri, gradually accumulated by him, are now owned by his family. At the time when the system of steadily exhausting virgin soils was all but universal, Mr. Rankin kept up the fertility of his land by selling all his maize "on the hoof," although towards the end of his life he was growing 14,000 to 20,000 acres of that grain. After raising four or five maize crops, the fields were sown with timothy and clover, to be grazed by cattle and pigs. About 1,000 working horses and mules, 10,000 steers, and 25,000 pigs are kept on the set of farms, and an illustration is given of forty-two-row cultivators at work in a maize field of 6,000 acres. During the summer and autumn the cattle graze on the blue grass, timothy, and clover; while they are wintered on ensilage, maize, fooder, and maize in the ear or shelled. The pigs follow the cattle, but are fed on maize in the ear at night, at least in cold weather.—"The Producers' Review."

The Orchard.

THE BANANA INDUSTRY IN NORTH QUEENSLAND.

By CHARLES ROSS, Instructor in Fruit Culture.

I have just received from a Northern correspondent a few photos. illustrating some phases of the banana trade and culture, and it brings to my mind a few facts that were observed during my first and following

Plate 42.

tours in North Queensland relative to the industry. The object of the illustrations is to show the difference between Chinese and white grown bananas, also the quality of the product now being shipped, and that which should be.

No. 1 is a bunch grown by Mr. Martin Tenni, at Upper Freshwater, near Cairns. It is by no means a record bunch, but contains 18 dozen and 3 bananas, in 12 hands, weighing 75 lb. The fingers are well developed, very firm, and under proper conditions fit for shipment. From information gathered from those who have handled bananas in the past, the bunch is similar in size, weight, and maturity to those shipped from that port in the palmy days of the industry.

No. 2 is a bunch of Chinese production, and was selected by my correspondent as a fair average sample of a consignment on the wharves prior to being shipped to Melbourne on the 15th March. It contains 155 fingers on 9 hands, and weighs 32 lb. It will thus be seen that the latter bunch carries two-thirds the number of the former, but the contrast in weight is much larger, the weight of No. 1 being more than $2\frac{1}{4}$ times that of No. 2.

The difference in the two productions is mainly due to the methods of cultivation adopted. It, however, is equally important that more discrimination should be exercised when cutting for shipment. I am of opinion that bunches almost fully developed will carry and be in better condition at their destination than by the wasteful practice of sending half-grown fruit, provided always that freighting is done with proper care. It goes without saying that 75 lb. bunches will not stand the knocking about that those of half the weight can stand. Shipping agents may not all agree with my contentions, but the opportunity offers for testing it by a few properly controlled experiments. I should like here to reiterate a former suggestion I made after my Northern tour in 1911—that of establishing one or more small experimental areas, under our direct supervision, for the systematic culture of bananas in particular, in such localities where there is a probability of a commercial expansion becoming a success.

Some years ago, when shipments were much larger, complaints relative to immaturity were little heard of; but since outside competition has become keener, and since the fruit-fly scare which overtook Victoria has been the means of that State placing such restrictions upon the Queensland trade, the practice of sending down immature bunches has become general.

The impositions demanded, such as netting in the bunches whilst on the plant, and further keeping them (after being cut) for a certain period before shipment, have been relieved mainly through the persistent and praiseworthy opposition of our own Department, but there still remains an impression in the conservative mind of the Chinese grower that "fat" bananas would be considered fly-infected by Victoria. Bad handling has played its part since the decline of the industry, and it is to be feared that the care exercised previously, or the want of it, points in the same direction, notwithstanding the fact that the shipping companies are anxious to restore the trade, and have gone to considerable expense in fitting their boats with better appliances. The increase of cargo during the sugar season naturally deprived the banana of a portion of the care it receives during the off season, and no doubt accounts for

the statements heard in the South—that the Queensland bananas are not as good then as at other times.

In this connection I would like to remark that the conclusion drawn by the Northern growers is that Melbourne is a better market than Sydney, as it has been proved over and over again that for the same quality of stuff sent to the two ports, before the foregoing drastic measures came into operation, the best prices were obtained from the former port, and, in consequence, during recent years Sydney has rarely received the best product—in fact, what is considered a good second-class bunch to-day was then unworthy of shipment.

BUDDING CITRUS TREES IN NORTH QUEENSLAND.

By G. WILLIAMS, Cairns.

Though the orange family are amongst the best known and most widely distributed of Queensland fruits, their propagation by either budding or grafting is (outside of Southern Nurseries) but little understood or practised. Directions for budding, which for various well-founded reasons has superseded grafting, have from time to time been published, but indifferent results have mainly attended the efforts made in carrying those into effect. Failure would appear to be mainly due to the directions given being either misleading or lacking in most important details. The same principles govern the success of the operation throughout Queensland, and, despite prevailing opinion to the contrary, it has been found that the same measure of success can be obtained as far North as Cooktown—in either grafting or budding—as may be anticipated in Southern districts.

The most important features essential to success are that the stock is in a suitable condition, the buds sufficiently developed and taken from parent tree whilst it is in a dormant state, and that they are carefully inserted beneath the bark of the stock. The method of cutting the bud from the shoot, its insertion, and tying have been so frequently given that repetition is not warranted. Some writers assert that, with plump buds and the bark readily detachable from both stock and scion, success is assured; but this theorising is not borne out in practice.

Spring or early autumn are the seasons usually chosen for budding, though with care and subsequent attention it may be accomplished at almost any season. Extremes of temperature and a dry atmosphere are not conducive to best results. The most convenient-sized stocks are those about a quarter-inch (or less) in diameter, near the ground level, where with small stocks the buds are inserted. They are more conveniently handled on account of being pliable and more likely to continue in the requisite stage of growth than when further advanced. More mature trees which are budded in the branches do not give such good results. On the condition of the stock in the first instance and the maintenance of continued expansive growth for a short period after budding (by watering when necessary) the success of buds almost totally depends. The buds should be inserted on the first intimation of a rise in the sap

of the stock, which is discernible by the expansion of its buds and subsequent appearance of young growth. This will be readily appreciated when it is borne in mind that the sap in ascending traverses beneath the inner bark, the diameter of the stock being increased during its ascent by its transformation into tissue; whilst at later stages of growth, when folige is more developed, it is either practically dormant or descending. During its ascent the same course is not followed, but accomplished by medium of the inner bark, and, contrary to some advanced theories in respect of formation of wood tissue, little or no increase is being then effected in the size of stem. A ligature applied at this stage—even though the bark lifts very freely—will show little or no tension; and it is noted that the bark of the stock dries and shrinks away from the bud if inserted at this stage, and the ligature or binding shows little if any tightening, but rather becomes slack on account of expansion by moisture. The reasons for success in the first stage and failure in the latter are readily accounted for. In the former, provided the bark of the stock is carefully lifted (to guard against injury it is usual to free the bark by pressure of the knife blade against the sides of the T cut, inserting it about two-thirds of the thickness of bark or just sufficient to clear the tissue beneath) and the bud inserted without exercising undue force—provided the bark lifts readily and is opened at the top of the T—the bud can be gently pressed downwards to the full extent, and the cut surface rests directly upon the formative tissue and becomes permanently attached in a short space of time. In the latter case, when sap is descending, the inner as well as outer bark, being practically inseparable, are again raised for its insertion, the possibility of a union is removed, for it is evident that only whilst cellular membrane is in process of formation that this can be effected.

With regard to the requisite wood for and mode of preparing buds, these have been frequently given, but the fact is overlooked that the bud and the branch from which it is taken are in a dormant condition. The idea of the necessity existing that the bark be readily separable from the wood is erroneous; this is to be deprecated rather than otherwise.

To have the buds dormant whilst the stocks are starting into vigorous growth may appear inconsistent and unattainable where trees are growing in the same area, but can be easily managed by taking the branches from the parent tree before there is indication of impending growth and heeling them in moist but not wet soil by about three-fourths of their length, or they may be entirely covered with fine soil for the short time necessary without detriment. The leaves shake off readily on being taken up for use, and care must be exercised at this stage that the scions are not exposed to the influence of dry atmosphere.

The buds, being cut with a sharp narrow blade and retaining the thin piece of wood, which is inseparable in cutting (and should have the most even surface possible that no inequalities exist when pressed against the stock), are inserted in the T cut without any attempt at removal of the thin wood referred to. Though its removal has been recommended, there is nothing to be said in favour of the recommenda-

tion, but quite the reverse. With thornless varieties the percentage of failures will be more than doubled, and an experienced operator would be much interested in seeing the system exemplified with many varieties where a small thorn is an almost invariable accompaniment to every bud and the supply of scions limited. Experience has proved it as being superfluous and detrimental amongst all varieties. To ensure success in budding, a little observation is necessary, but there is nothing intricate in the practice, which may be readily acquired by anyone devoting a little time and attention.

Statistics.

RAINFALL IN QUEENSLAND.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF MARCH IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING MARCH, 1912 AND 1913, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	March	No. of Years' Records.	March, 1913.	March, 1912.
North Coast.	In.		In.	In.
Atherton	9·02	11	17·87	7·48
Cairns	20·08	25	29·07	14·16
Cardwell	16·29	25	27·99	15·18
Cooktown	14·21	25	27·30	24·49
Herberton	8·73	25	10·57	3·88
Ingham	15·24	20	26·87	21·28
Innisfail	26·31	25	40·94	24·47
Mossman	...	...	27·03	...
Townsville	7·85	23	7·78	7·09
Central Coast.				
Ayr	7·69	25	14·19	4·11
Bowen	6·52	25	8·06	2·51
Mackay	11·65	25	12·51	5·52
Proserpine	15·15	8	15·31	7·98
St. Lawrence ...	6·80	25	4·07	3·01
South Coast.				
Crohamburst ...	...	...	...	...
Biggenden	...	...	1·34	4·67
Bundaberg	6·38	25	6·73	5·26
Brisbane	6·16	62	3·74	10·60
Childers	5·61	17	3·33	8·50
Esk	5·45	25	1·26	7·78
Gayndah	3·93	25	1·86	5·04
Gympie	7·46	25	1·37	6·62
Glasshouse Mount's	...	...	...	...
Kilkivan	4·94	25	1·07	3·52
Maryborough ...	7·21	25	1·73	13·17

Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	March.	No. of Years' Records.	March, 1913.	March, 1912.
South Coast—continued.	In.		In.	In.
Nanango	3·75	25	·75	5·67
Rockhampton ...	5·51	25	5·50	3·38
Woodford	9·38	25	4·54	11·75
Yandina	9·19	19	4·02	13·10
Darling Downs.				
Dalby	3·72	22	2·75	3·60
Emu Vale	...	...	1·61	2·75
Jimbour	...	...	1·95	5·62
Miles	3·45	25	3·89	2·93
Stanthorpe ...	3·46	22	3·88	3·85
Toowoomba ...	4·61	22	1·73	10·19
Warwick	3·24	22	1·30	3·17
Maranoa.				
Roma	4·08	21	1·93	2·36
State Farms, &c.				
Gatton College ...	...	...	1·59	...
Gindie	...	...	1·08	1·82
Kamerunga Nurs'y	...	...	...	...
Kairi	...	...	...	...
Sugar Experiment Station, Mackay	...	...	...	...
Bungeworgorai ...	...	...	1·51	...
Warren	...	...	...	...
Hermitage ...	...	...	...	...

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for March this year and for the same period of 1912, having been compiled from telegraphic reports, are subject to revision.

Horticulture.

PROTECTION OF PLANTS FROM FROST.

We have received from Mr. C. E. B. Welsh, F.R.H.S., of Sunnybank, the following very interesting and instructive letter dealing with the protection of plants from frost. Mr. Welsh's examples seem to be conclusive:—

"Having noticed the subject of 'The Protection of Pineapples from Frost by Smoke' in the March issue of the 'Agricultural Journal,' I submit a little of my own experience in preventing loss by frost.

"In the spring of 1911 I had an acre of early tomatoes planted which were frozen one morning. Having a waterhole near my cultivation, I put the horse in the slide and took two casks to the waterhole and filled them and then drew to the tomato patch; having a fine-rose water can, I proceeded to sprinkle the foliage of each plant. I was unable to finish them all before sunrise. About midday it was very easy to observe where I had left off watering. Those which had received the sprinkling of water were in a green and uninjured condition, but the remaining plants not so treated were black with frost and ultimately died right back.

"In England hundreds of acres of chrysanthemums are grown out of doors, and upon the approach of winter are lifted in clumps and planted close together in glass houses, which are not heated unless very severe weather occurs, the object being to retard the opening of the flower buds as much as possible so that they may be kept late, when the market prices are high. It often happens that during a sudden change to cold weather in the night, a frost sufficiently severe to freeze the chrysanthemum blossoms occurs; the general practice is to then go over with a syringe or fine-rose water can and sprinkle the flowers before sunrise. This prevents any damage being done in the process of thawing. I have seen pure white, yellow, and pink blossoms quite uninjured after being frozen, and if they had not received a watering they would have been ruined. The explanation of this is that the sap in the tissues of the plant and in the petals of the flower becomes frozen, and the sprinkling of cold water causes a gradual thaw with a greatly diminished expansion, and the sap is thus able to again circulate through the plant instead of bursting the walls of the tissues of the plant, as would be the case with a rapid thaw.

"This is on the same principle as the freezing of a water pipe. If the pipe, or, rather, the ice in the pipe, be suddenly thawed, the pipe

bursts or cracks, because as the ice is thawed the temperature of the water rises and it expands, and, being unable to find the required extra space so suddenly, the pipe is burst by force of expansion, because warm water required more space than cold water. If the ice in the pipe be gradually thawed, there is less danger of a breakage. I know this principle is in opposition to that given in the 'Agricultural Journal;' but, if the principle I have outlined is erroneous, what is the explanation of the results achieved in the examples given? Of course the remedy which I have adopted can only be applied on a small scale unless one has an irrigation plant. For the market gardener with a fair water supply the method may be of use, because, generally, only a small area of early beans, tomatoes, and cucumbers is planted for a very early crop, the main crop being left until all danger of frost is over.

"During the coming winter no doubt many opportunities will occur to try this and smoke methods; and if others later on will relate their experience through the medium of the 'Journal,' we may derive some benefit and advance towards a solution of the frost trouble. As the country is being opened up, loss from frost will increase, and there are many farms which are now above frost level which will in time, with the clearing of the timber, come within the frost zone. Upon the Blackall Range, owing to the falling of the scrub, there are several places where frost leaves its trade mark that only three and four years ago were free from injury by frost."

REMEDY FOR SEA-SICKNESS.

Those bad sailors who may be chary about facing a trip to the Sydney Exhibition, because of inevitable sea-sickness, may be comforted by the following information, for which "Bagman," in the Melbourne "Telegraph" is responsible:—"A mixture of equal proportions of nitrate of amyl and pure alcohol is a sure preventive of and cure for sea-sickness. He relates how, on a trip to Robe in the little steamer 'Penola,' during rough weather, one of his friends, who he knew usually suffered dreadfully from sea-sickness, kept himself perfectly well and comfortable by the use of this remedy; and how another friend, who had been sick for some time, was in a surprisingly short time restored, and able to make a hearty meat at the table. The mixture, which can be obtained from any chemist, is applied as follows:—Directly the dread feeling of illness approaches, damp a handkerchief with part of the above, when, on inhaling the aroma, all sensations of discomfort from sickness will depart."

Tropical Industries.

LONG-STAPLE UPLANDS COTTON.

Several factors require to be considered in cotton-breeding, and amongst them some of the most important are—fineness of lint, the relative yield of lint to the total yield of seed cotton, and the uniformity of length of all the fibres when properly combed out and examined. On this latter point a (to cotton-growers) very important bulletin was issued by the United States Bureau of Plant Industry in 1907, written by H. A. Allard, Scientific Assistant, Cotton Breeding Investigations. He said that there is an apparent lack of uniformity [in the long-staple Uplands cottons] which deserves considerable attention from the standpoint of cotton growers and breeders. This lack is due to a group of fibres, about twice the length of the general covering. This group arises from the centre of the main body of fibres, or, often, from those having a point of attachment near the larger end of the seed. This character is usually asociated with the finer, more crinkly types of long-staple cottons, such as the fine long-linted Egyptian and Sea Island varieties, and the long-stapled Upland varieties—Griffin, Allen, Cook, &c. It is a character which becomes more apparent as a variety is being rigidly selected generation after generation for finer, longer staple. This has been well illustrated in the improvement of the lint characters of the Russell variety, and, to some extent, the Jones variety. The original condition of both of these varieties is remarkably free from this so-called longer group of fibres. In the case of the greatly improved Russell strain, which has become distinctive enough in good lint characters and yield to be designated as a new variety—the so-called Columbia cotton—these longer fibres are evident to a remakable degree.

It had been more or less the rule with cotton-breeders and cotton-growers acquainted with the requisites of desirable lint characters to regard these extra-long fibres as an unfavourable feature. In this light they meant a variation towards non-uniformity. In the work of selection, to avoid as much as possible a perpetuation of this sort of variation, plants showing this character most markedly were regarded with suspicion, and, later, even discarded, although, in other respects, they were among the best in the field. A careful examination leads to the conclusion that these fibres should be regarded in a wholly different light. They are not longer fibres, as they have been generally considered, but are caused by more or less curling and interweaving, which results in the pulling out of fibres from adjacent seeds. It is important that breeders and growers of long-staple cottons should know that these apparently longer fibres are no indication of true lack of uniformity. The presence of these fibres in long-staple Upland varieties has, quite universally, led to the erroneous belief that such cottons are rather inferior in uniformity as regards length of fibres. The Griffin cotton,

in particular, recognised in other respects as the best long-staple Uplands cotton grown, has always been described as unsatisfactory so far as uniformity in length of staple is concerned, since the drawing out of fibres from adjacent seed is a marked characteristic of this variety.

A knowledge of the true nature of these longer fibres will clear the reputation of some of the best long-staple Uplands varieties of a serious fault hitherto wrongly attributed to them by all breeders and growers.

[A reference to the illustrations of these fibres in the December issue of this journal for 1907 will make the above explanation perfectly clear.]

PROPAGATING ABACÁ (MANILA HEMP) FROM SEED.

By M. M. SALEEBY, Chief of the Fibre Division, Bureau of Agriculture, Philippine Islands

Until very recently the propagation of abacá from seed was considered extremely difficult, impracticable, and of doubtful results. This belief was not entertained by the planters alone, but also by the several men in charge of the Fibre Division of this Bureau, including the writer. Recently, however, experimental plantings of abacá from seed made in connection with an extensive series of fibre experimnts at the La Carlota Experiment Station have so far given such unprecedentedly good results as to entitle this method to a more serious consideration than it has heretofore received.

The experiments in question constituted a separate group of plots included in the section set aside for experiments in abacá varieties from the principal abacá districts of the Philippines. The varieties of each district occupied two groups in the section—one for reproduction from seed, and the other from rootstocks.

The varieties of South-eastern Mindanao were the first to be planted, and the rootstocks were set out in the permanent plots prepared for them at the same time the seed was planted in the nursery. The seed pods, or fruits, were secured from the same varieties as the rootstocks, and were transported in the fruit to the station, where they were thoroughly cleaned and immediately planted in germinating boxes specially prepared for them.

Seeds of the following Mindanao varieties were planted:—*Maguindanao, Tangongon, Libuton, Punucan, Baguisanon basag, Baguisanon lawaan, Pulajan, Agutay, Sinabá,* and *Bangulanon,* the first variety and the last one failing to germinate at all, while a very low percentage of germination was obtained from the *Agutay* and the *Maguindanao.* The highest percentage of germination and the quickest growth were exhibited by the *Pulajan, Baguisanon lawaan,* and *Tangongon* varieties, in all of which the growth of the abacá plant is known to reach its maximum extent.

Abacá seed does not retain its vitality for any considerable length of time, unless it is carefully preserved, and even then three months have often proved to be too long a period. The best results are obtained

from fresh seed, which, for this reason, must be transported in the fully developed but not over-ripe fruit (seed pod) if it is to be transported from one province to another. This, however, does not apply to its transportation to countries outside the Philippines where more than three weeks are required to reach its destination. For this latter purpose it is best to pack the freshly cleaned seed in a manner similar to that used with other seeds.

The seed should be first planted in germinating boxes. The soil should be very fine and kept moist practically all the time until germination shall have begun. During this entire period the germinating boxes should be placed under complete shade, and, after germination, under half shade. Daily watering and constant attention are required until the seedlings have attained the height of about 30 centimetres (12 inches), when they are ready to be transplanted into the nursery. This stage of growth is usually attained in about three to six months, depending on the quality of seed, the care given the seeds and seedlings, and the variety, but more especially on the last.

The nursery should be very carefully prepared and kept clean from weeds all the time. Before transplanting, the leaves of the seedlings should be all cut back, leaving about one-third of each. The seedlings are set out about 20 centimetres (8 inches) apart in the row, and the rows about 40 to 50 centimetres (16 to 20 inches) apart. If the rain is not regular and frequent, watering every day is necessary. The seedlings thus planted will continue to grow unchecked, and in four to five months they are ready for the second and last transplanting to the permanent field. If the roots are not mutilated in digging up the plants, and if their leaves are again cut back, the seedlings will take root and continue their growth in a surprisingly short time, providing, of course, the soil around their roots is kept loose and moist during the first week.

The Mindanao varieties propagated from seed by the method briefly described above occupy a group of plots adjacent to that planted with the same varieties from rootstocks. Both groups are given the same treatment, and their soil, of course, is identical. The final results, after the varieties in both groups shall have attained maturity, promise to be of great interest, and data and facts, heretofore undetermined, will surely be of value to the growers of abacá all over the Islands. Until these experiments were started, it was a common belief that abacá reproduced from seed requires a year longer to come to maturity than when reproduced from rootstocks or shoots. This belief may already be said to have been disproved, for the plants reproduced from rootstocks do not average more than about four months ahead of those from seeds.—"Philippine Agricultural Review."

THE GUADA BEAN.

In our last issue we published an article by Mr. H. Newport on three varieties of Gourds. One of these was the Snake Gourd, the so-called Guada Bean. Mr. Newport gave the yield at Kamerunga at about five to seven pods. It would seem that the gourd is much more prolific

in the South, as we have received a letter from Mr. D. Crombie, of Wondai, who says he planted a vine in October last, which has been bearing heavily since the end of November and still has two dozen gourds of various sizes on it, with a number just forming besides.

Mr. B. Tweed, of Raglan, N.C. Line, says that he got three seeds out of a lot received from New South Wales to germinate. These three vines produced a hundred or more pods, and there are over a hundred more coming on. The number of seeds per pod is about ninety, and Mr. Tweed finds a ready sale for large numbers. From this evidence it appears that the vegetable is eminently suited for persons who have only a small patch of ground to devote to vegetable growing.

FIRST CROP OF MAGUEY (CANTALA) AND SISAL.

Commenting on these fibres, Mr. Saleeby writes:—

"The first harvest of leaves from the maguey and sisal plants is always of a much poorer quality than subsequent harvests. This is due to the fact that the first and oldest leaves are always considerably shorter and often more damaged than the later ones, besides being often partly dried up. For these reasons the first crop of fibre is both too short and improperly cleaned, and does by no means represent the quality of the subsequent crops. Besides, such crops almost invariably leave in the minds of buyers a bad impression which may take several crops to overcome.

"In order to avoid such occurrences, the producers of these fibres, especially those who use or intend to use machinery for cleaning the fibre, should be careful in so marking their first crop as to show that it is not a representative sample of subsequent crops, thereby avoiding future sacrifices on their part.

"Attention has recently been called to this important fact by Mr. L. H. Dewey, who cited a recent case of this kind occurring in Hawaii."

THE NIPA PALM INDUSTRY IN THE PHILIPPINES.

The Ceylon "Tropical Agriculturist" publishes a very interesting article from the "Louisiana Planter" on the products of the Nipa palm, and says:—"Why not in Ceylon as well?" We also say:—"Why not in North Queensland as well?" And why not in Papua, where the banks of tidal rivers and swamps are covered with a dense growth of Nipa? The following is the article alluded to, which was written by Mr. H. D. Gibbs, of the Bureau of Science, Manila, and read before the International Congress of Applied Chemistry:—

NIPA FRUTICANS.

"This palm, which generally occurs near estuaries of rivers, is found along the South-west coast of the Island, and is common about Bentota and Gintota, the name of the last place being derived from

the native name of the palm (Gin-pol). The composition of the sap of the Nipa is remarkably similar to that of coconut and other palms tapped for toddy or, as it is called in the Philippines, 'tuba.' As the sap flows, it is practically neutral and contains no sugar, but sucrose; but the inversion of sucrose and the resulting process of fermentation commence almost immediately after extraction. So far as the Philippines are concerned, the Nipa is the most important source of alcohol.

"The palm is specially suited to swampy lands subject to daily overflow by tides, so that such areas, which are fairly extensive and fit for nothing else, might well be devoted to it. The tree fruits four years after planting, and tapping can begin in the fifth year. After the formation of fruit, the stalk is cut across near its top, usually just below the fruit, and each day a thin slice is removed, and a clean sweet sap exudes from the wound. This is daily collected and carried to distilleries with the aid of boats. Good specimens of the palm have been known to yield sap on a commercial basis for as long as fifty years.

"It has been computed that no less than 90 millions litres of the sap are produced annually in the Philippines. Pot stills, which are unreliable, give a liquor containing from 20 to as much as 55 per cent. alcohol; with continuous process stills, results are more constant (about 50 per cent.), while with the use of modern rectifiers alcohol with 93 to 96 per cent. spirits is got. A distillery now working produces 93 per cent. alcohol at a cost of less than ·04 dollar (American) per litre, or say 12 cts. per quart. Approximately 10 million proof litres are produced annnually by about 30 distillers. Among the beverages prepared is one which, after aging in wood, is said to possess all the characters of the best brandy.

'Sugar is not produced in commercial quantities, though it is considered that a thriving industry is possible. A conservative estimate of production is as follows:—2,000 palms per hectare yield 86,000 litres sap containing 12 per cent. recoverable sugar, equivalent to 10·75 kilograms of 96 per cent. centrifugal sugar. An equipment corresponding to a 500-ton sugar-mill can be kept running for 180 days a year on the sap of 750 to 1,000 hectares of Nipa, and should produce annually about 9,000 tons of 96 per cent. sugar.

"Mr. Gibbs goes fully into the details of manufacture, and declares his strong conviction that more profit is to be made from Nipa by sugar refining than by distillation. In this connection he mentions that he is fully aware of similar claims for the Kitul (*Caryota urens*) and Sugar Palm (*Arenga saccharifera*) having never been realised, but is of opinion that the difficulties encountered with these palms do not exist in the case of Nipa.

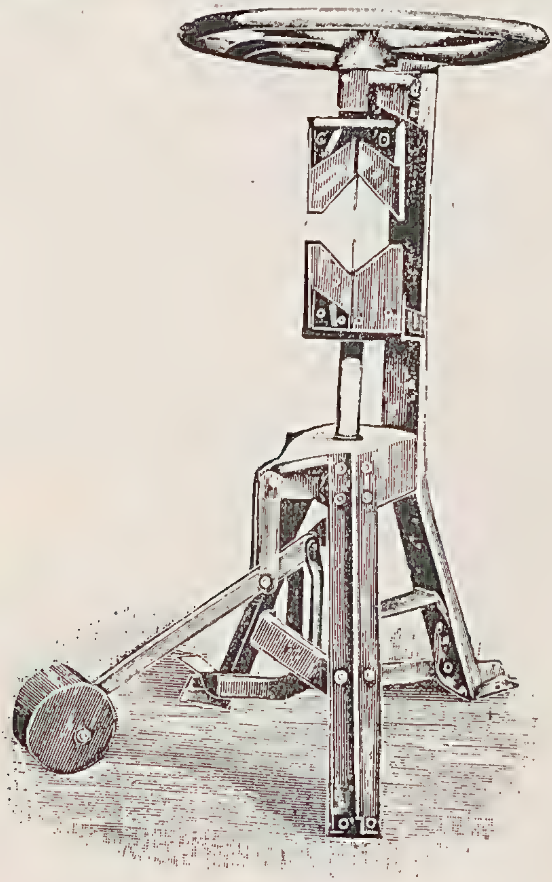
"Under the circumstances it would be worth while exploiting the palm that occurs locally, with a view to ascertaining whether the same favourable conditions exist here as in the Philippines for establishing a profitable industry whether in the production of spirit or sugar."

COCONUT HUSKING MACHINE.

Professor Dunstan, Director, Imperial Institute (says the "Tropical Agriculturist," Ceylon) has transmitted to the Ceylon Agricultural Society "some useful information with reference to the latest developments in machinery for treating coconuts, especially with regard to the separation of the husk, which at present is wrenched out by hand with the aid of a spike stuck in the ground.

"Mr. Haake of Berlin quotes 260 marks for a machine, which is thus described:—It consists of two sets of cone anvil cutters, arranged one above the other, each consisting of three radially-placed blades, of which the lower cutter may be adjusted vertically by means of a lever and can be fixed in such a manner as to prevent it from turning, whereas the upper one is worked by means of a hand-wheel. The coconut is placed point uppermost between the blades, and then the lower cutter is pressed upwards by setting the foot on the counter weights. This causes the blades, which are exactly opposite to one another, to cut into the layer of fibre as far as the hard shell. By causing the upper cutter to revolve by means of the hand-wheel, the entire layer of fibre is divided into three long longitudinal segments which can then be easily removed by hand. This process does not present the slightest difficulty with fresh coconuts, so that a skilled workman can remove the fibre from as many as 100 nuts in an hour.

"The illustration below will better explain the structure of the machine:—



Botany.

CONTRIBUTIONS TO THE FLORA OF QUEENSLAND.

By F. MANSON BAILEY, C.M.G., F.L.S., Colonial Botanist.

Order CHENOPODIACEÆ.

CHENOPODIUM, Linn.

C. rhadinostachyum, *F. v. M.* in Wing's Southern Science Record, ii. (1882), 98. Plant erect, clothed with short, spreading, jointed, somewhat glandular hairs; leaves about 1 in. long, ¼ in. broad, the margins lobed, ending in a bluntish apex, the base tapering into a petiole scarcely as long as the blade. The flowers exceedingly small, clustered into minute glomerules and these again arranged into axillary and terminal simple or branched and soon interrupted spikes, floral leaves reduced to bracts, hardly longer than the clusters, broad towards the base, acute at the apex, sepals deeply concave, but not keeled (while young); stamens one or more in each flower, filaments at length exceeding the sepals; ovary vertical, seeds a glossy purple or black.

Hab.: Adavale, *Mrs. J. F. Bergin.*

Order GRAMINEÆ.

PANICUM, Linn.

P. capilipes, *Benth.*, Flora Austr., vii., 484. Foliage of the glabrous varieties of *P. repens;* spikelets similarly 2-flowered, but the inflorescence nearer that of *P. decompositum.* Leaves narrow and rather long, the ligula scarcely prominent. Panicle at length exserted from the last leaves, not very spreading, 3 to 6 in. long, with numerous capillary flexuose divided branches, the lower ones clustered (this, however, is not the case in the Queensland form). Spikelets all on capillary pedicels, rather above 1 line long. Outer glumes less than half the length of the spikelet, 3-nerved, acute; 2nd and 3rd glumes nearly equal, acute or acuminate, 5-nerved. A male flower in the 3rd glume. Fruiting glume rather acute, smooth or minutely rugose, *Benth.* l.c. (Escape Cliffs and Port Darwin specimens.)

Hab.: Mount Larcom, *E. W. Bick.*

P. decompositum, *R. Br.*, var. **tenuior,** *Bail. n. var.*

This variety differs from the usual form met with principally in its more delicate habit and smaller spikelets and grain.

Hab.: Gindie, *E. W. Bick.*

SETARIA, Beauv.

S. glauca, var. **pulchella,** *Bail. n. var.* (Plate 43). A very pretty slender densely-tufted plant, about 2 ft. high, the stems vary much in height and number in the same cluster, sometimes as many as 50 seed bearers from a single seed, but as the stems branch from near

C.T.W. del.

PLATE 43.—SETARIA GLAUCA, BEAUV. AND VARIETIES.

A.—S. glauca, Beauv. *var.* pulchella, *Bail. n. var.*
B.—S. glauca, Beauv. Normal form.
C.—S. glauca, Beauv. *var.* minor, *Bail.*

the base some of this number may be lower branches, very minutely scabrous, nodes glabrous. Leaves narrow, about 5 in. long, the ligula a dense row of woolly hairs; sheaths strongly striate, spiked, or spikelike; panicle cylindric, 1 to 1½ in. long. The hairs of the rhachis so short as to appear wanting. Spikelets roundish-ovate, not close, almost appearing as if in rows. The awn-like branches shortish. In other respects this variety does not differ from other forms of the species.

Hab.: Gindie and Bushley, *E. W. Bick.*

S. aurea, *Hochst. ex. A. Braun in Flora xxiv.* (1841), 276. Very near *S. glauca,* Beauv., differing principally in its longer much narrower leaves and in its longer and narrower panicle, which is of a yellowish to bright orange or reddish-golden colour.

Hab.: Yeppoon, *E. W. Bick.*

ANDROPOGON, Linn.

A. sericeus, var. **mollis,** *Bail. n. var.* (Plate 44).

Except in its smaller growth and being clothed with a more dense covering of woolly hairs, this form does not differ from the usual one met with in Queensland, and is equally valuable as a pasture species.

Hab.: Gindie, *E. W. Bick.*

SPOROBOLUS, R. Br.

S. indicus, var. **intermedius,** Bail. *n. var.* (Plate 45). This new variety only differs from our other two Queensland plants—in its loosely-dense panicle from *E. indicus* proper; and in its want of the prominent interruptions of the inflorescence from var. *elongatus.*

Hab.: Gindie and Mount Larcom, *E. W. Bick.*

ARISTIDA, Linn.

A. utilis, *Bail.,* Ql. Agric. Jl. xviii. (1907), 340 (Plate 46). It is interesting to meet with this useful grass so far South of its hitherto known habitat (near Cooktown), and find the Southern specimens producing longer stems. I also find that the lateral awns of the spikelets of these Southern specimens are not so remarkably shorter than the central one as in the type.

Hab.: Bushley, *E. W. Bick.*

CYNODON, Pers.

C. ciliaris, *Benth.,* Flora Austr. vii., 610. A dwarf species, with the creeping habit of the common Couch Grass (*C. dactylon,* R. Br.). The stems erect, 6 or more in. high, slender, more or less clothed with loose, long, very slender hairs. Leaves, upper ones flattened, about 3 in. long, ciliate with long, weak hairs, particularly the sheaths. Spikes 1, 2, or 3, about 2 in. long, rather more rigid than in *C. convergens.* Spikelets rather small, converging in 2 rows on a flattened rhachis, the rhachis of the spikelet not produced above the flowering glume. Outer glumes 1½ lines long, the keel acute but scarcely winged. Flowering

PLATE 44.—ANDROPOGON SERICEUS, R. BR. VAR. MOLLIS, *Bail. n. var.*

PLATE 45.—SPOROBOLUS INDICUS, R. BR., AND VARIETIES.
A.—Sporobolus indicus, *R. Br. var.* intermedius, *Bail. n. var.*
B.—Sporobolus indicus, *R. Br.* Normal form.
C.—Sporobolus indicus, *R. Br.*, *var.* elongatus, *Bail.*

PLATE 46.—ARISTIDA UTILIS, *Bail.*

glume broad and very concave, much shorter than the outer ones, shortly ciliate on the keel and margins, with a transverse ring of long spreading hairs near the end. Palea not much narrower than the glume, with a similar ring of hairs, the two nerves not closely contiguous.

Hab.: Adavale, *Mrs. J. F. Bergin.*

ERAGROSTIS, Beauv.

E. interrupta, *Beauv.*, var. **grandis,** Bail. *n. var.* The present plant is a very large growth of this most variable species. The grass mostly met with in Queensland seldom attains a height much over 1 ft., while the present is over 3 ft., thus more nearly approaching some of the Indian forms.

Hab.: Emerald, *E. W. Bick.*

E. major, *Host.* Stink Grass (so-called on account of its disagreeable odour in the green state, which is caused by the row of glands near the margins of the leaves; this odour is nearly or quite lost in the dry state). Height of plant, ½ to 3 ft., very bushy and glandular, glabrous or scantily hairy; ligula a fringe of short hairs, blades linear lanceolate, tapering to a fine point, 2 to 5 in. long, 2 to 4 lines broad, subglaucous. Panicle ovate-oblong, 2 to 5 in. long, rather dense or loose, all the divisions filiform, angular scabrid. Spikelets ovate-oblong, 2 to 6 lines long; rhachilla persistent. Glumes sub-obtuse to acute, about 1 line long, upper 3-nerved, keels scabrid, margins minutely serrulate. Anthers oblong, grain globose brown, loose within the turgid valves, about ⅓ line diameter. Doubtful if really indigenous in Queensland, for it has only been noticed during the past few years; but the species is frequently met with in tropical countries.

Hab.: Brisbane River and Central Queensland, *E. W. Bick*, March, 1913; Darling Downs, *C. T. White*, December, 1912.

BOTANIC GARDEN NOTES.

By J. F. BAILEY, Director.

PALMS—(*continued*).

Dictyosperma album (Fig. 6) is a species belonging to Mauritius and Bourbon countries, which furnish us with some handsome plants of the Order, and the one now under notice is very ornamental.

In habit it is very similar to our "Piccabeen." The unexpanded foliage and the leaf-sheaths are covered with a close tomentum which adds considerably to the beauty of the plant.

Good seed matures on the specimens in these gardens, and the seedlings raised have a reddish tinge during the early stages of growth.

Chrysalidocarpus lutescens (Fig. 7), or *Areca lutescens,* as it is commonly catalogued in nurserymen's lists, is one of the few stoloniferous palms seen in cultivation.

It is of striking appearance, its slender stems being surmounted by gracefully curved foliage which is, like the stems, of a yellowish

Plate 47 (Fig. 6).—Dictyosperma album.

colour. Accompanying the main stems are others of various heights, giving the clump a furnished appearance from bottom to top.

Some years seeds mature on our plants, last year's crop being especially fertile. It is admirably adapted for pot culture, and is popular for house decoration, being graceful even in the thumb pot size.

PLATE 48 (FIG. 7).—CHRYSALIDOCARPUS LUTESCENS.

Arenga saccharifera (Fig. 8), the Sugar Palm or Kabong, is one of the most conspicuous objects in the Gardens, where it is represented by several good specimens in various stages of growth. It has immense leaves, which are shiny green above and light silvery underneath.

Griffith states that this is one of the handsomest and most useful of the Malayan palms, and that it is commonly cultivated in the interior at Malacca in lines of trees, recalling to mind the form of Gothic arches.

PLATE 49 (FIG. 8).—ARENGA SACCHARIFERA.

The parts chiefly employed for useful purposes are the black fibre forming the rete, the juice, and the young albumen.

The former is twisted into ropes or cordage, renowned for its power of resisting wet, while the stiffer portions are used for making brushes.

PLATE 50 (FIG. 9).—OREODOXA REGIA.

The juice obtained by cutting the male inflorescence is either drunk as toddy or made into sugar or "gula kabong," as it is called. It is said that the juice of the female inflorescence is not suitable for sugar.

The young albumen preserved in syrup forms one of the well-known preserves of the Malay States. After flowering or fruiting, the tree dies, when the pith may be used for sago, an old stem yielding as much as 150 lb. of the material.

Those of our trees at present flowering are males; but in previous years female trees fruited, and from the seeds some of the present representatives were raised.

The fruit is fleshy and extremely acid, exciting severe inflammation of the mouth if chewed. It was the basis of the " infernal water " which the Moluccans used in their wars to pour over their enemies. As in the case of the species of *Caryota*, the tree when it has attained maturity throws out a large cluster of flowers from the axil of the topmost leaf, and this is succeeded by cluster after cluster, each one lower than the one before it, until the lowest leaf-axil is reached, when the tree dies.

Oreodoxa regia (Fig. 9), the Royal Palm of the West Indies, is a majestic species, having thick clean stems which are much swollen at the base, and surmounted by a dense head of bright green foliage, the drooping segments of which are closely set, and being gracefully arched give the leaves a plume-like appearance. Some of our plants flower regularly, but so far no fruits have matured.

PRESERVING FRENCH BEANS FOR WINTER USE.

During the past season there has been a perfect glut of French Beans on the markets, and in the height of the season prices ruled so low that in some cases the growers would not take the trouble to pick them. " Garden and Field " shows how the surplus crop can be preserved for an indefinite length of time:—

" The bean should be gathered in dry weather (great heat is liable to cause them to mildew), and placed in a china or earthenware vessel, arranged in layers, with a thick sprinkling of salt between each layer. The vessel containing them should be kept in a cool and airy situation.

" In a few days' time the beans will be found to have shrunk considerably, and the salt to have melted into brine. More beans and salt can be added from time to time, until the vessel is quite full. Should the weather be very hot and damp, the beans should be inspected every day or so, and the top layer pressed under the brine; otherwise those that are not quite submerged may show signs of mildew. If this is the case, the affected beans should be at once removed, and more salt scattered over the top. When once the cooler weather sets in, they will need no further attention, but will keep good indefinitely in any place free from frost.

" When required for use they should be lifted from the brine and washed in cold water. The strings can then be removed, and the beans cut up in the usual manner, and they should be allowed to lie for an hour or two in water before being cooked, in order to remove any trace of saltiness. A pinch of soda in the water in which they are boiled will greatly improve the colour."

Entomology.

PUMPKIN BEETLES, AND HOW TO DESTROY THEM.

By E. JARVIS, Assistant Government Entomologist.

The genial climate of Southern Queensland is eminently suitable to the growth of pumpkins, marrows, and other cucurbitaceous plants, which flourish luxuriantly in almost any situation, and, as a rule, require little or no attention.

Unfortunately, however, these useful vegetables are subject to the attacks of insect enemies, which not only devour the foliage and flowers, but frequently kill both seedlings and young plants.

It is hoped that this illustrated article will enable growers to easily recognise the different stages in the life-history of one of the worst of these pests, and also help them to successfully control its ravages.

THE BANDED PUMPKIN BEETLE.

(MISCALLED "PUMPKIN LADYBIRD.")

(*Aulacophora olivieri, Guérin.*)

HABITS, FOOD PLANTS, AND DISTRIBUTION.

This is our most destructive insect of marrows, pumpkins, &c.; and its conspicuous colouration, numbers, and voracity have made it familiar to all. The adult beetle, which measures about a quarter of an inch in length by a little more than an eighth in width, is not circular in form like a true "ladybird," but has the posterior portion twice as broad as the thorax, with the extremity of the abdomen somewhat pointed and projecting slightly from under the wing-cases. (See Fig. J.) The general colour is tawny orange-yellow, with the exception of the antennae (excluding 1st, 2nd, and 3rd basal joints), ends of legs, four large blotches on wing-cases, jaws, eyes, and end of body, all of which are black.

These insects fly readily, during the heat of the day, but, if driven from a favourite food, generally return to it on the first opportunity. Although especially partial to the leaves and flowers of cucurbits, they may be found also on the foliage of various trees and shrubs, and doubtless have a wide range of dietary.

Of late years the species has developed a liking for fruit, and in 1908 was recorded as seriously damaging ripe cherries in New South Wales. The Government Entomologist of that State—who examined a row of about a dozen of these affected trees—could hardly find a sound cherry in the whole crop, and reported that "under the trees there were hundreds of dried cherries, only stone and stalk, and those hanging on the trees had holes gnawed all over them." He discovered also that this was not the first time that pumpkin beetles had been noticed on ripening cherries, and that they were known to destroy apples by gnawing the stalks of the young fruit and causing them to fall.

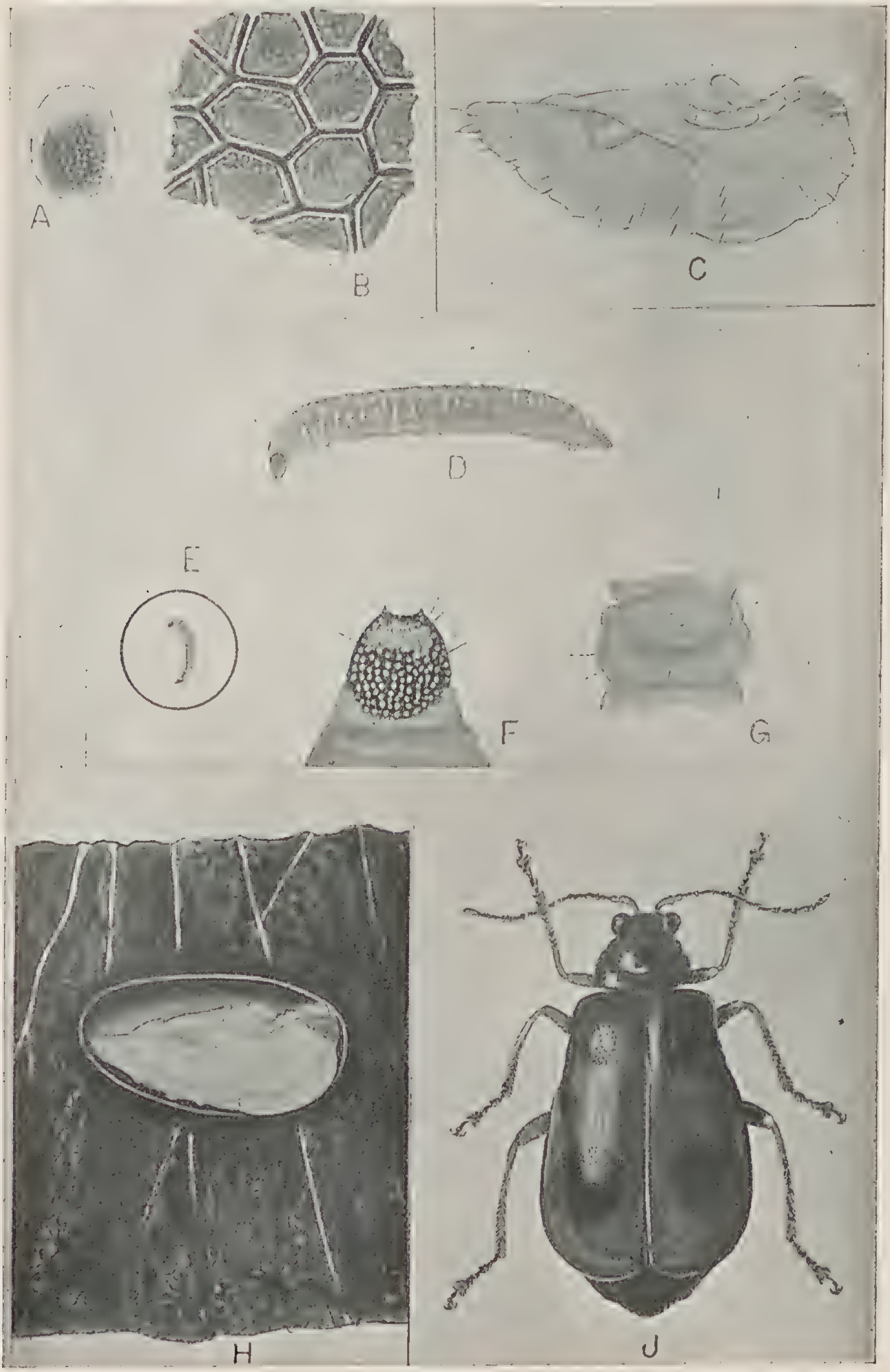


PLATE 51.

A.—Egg, enlarged 20 times.
B.—Surface of egg highly magnified.
C.—Pupa, magnified 10 times.
D.—Larva, 22 days old, enlarged.
E.—Larva, natural size.
F.—Anal segment of larva, showing plate-like upper surface.
G.—Metathoracic segment of larva showing position of hairs.
H.—Sketch of pupa lying in underground chamber.
J.—Pumpkin beetle (*Aulacophora olivieri*) magnified 8 times.

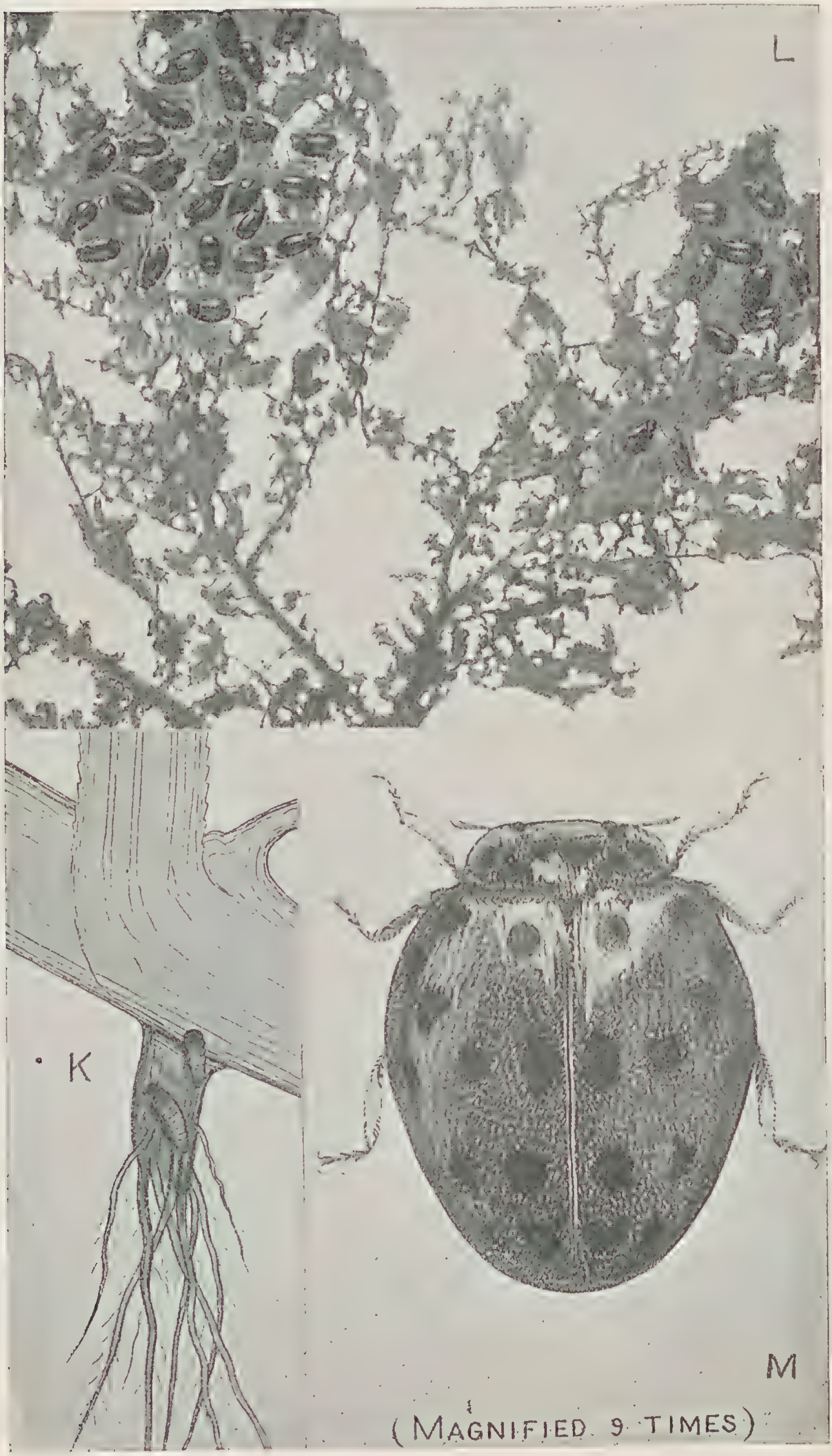


PLATE 52.

K.—Sketch showing larvæ tunnelling root of pumpkin vine (from nature).

L.—Pumpkin beetles (*A. olivieri*) at work, natural size.

M.—Potato ladybird beetle (*Epilachna 28-punctata*).

In 1911 a Queensland grower informed Mr. Tryon that these leaf-eating beetles had attacked young fruit trees in the Allora district.

Their presence at times in thousands on a single pumpkin plant admits of easy explanation, and should not, I think, be attributed entirely to gregarious instincts, as it seems reasonable to assume that, in the event of one of these beetles chancing to find exceptionally palatable food, it would remain on it, and, being conspicuously coloured and in full view of passing insects, would naturally attract others of its kind, each fresh arrival helping, of course, to make the assemblage increasingly noticeable.

This pest has been recorded in Queensland from various localities in the districts of East Moreton, Wide Bay and Burnett, Darling Downs, Port Curtis, Cook, Warrego, Leichhardt, and Burke.

In 1907 it was especially harmful in Southern Queensland during November; but the most serious recent outbreak occurred two years later, when the insect did enormous damage over a wide area of the State.

DESCRIPTION AND LIFE-HISTORY NOTES.

Eggs.—The eggs of the pumpkin beetle are probably laid either on the surface of damp soil or immediately under it among grass roots, &c. They are rich yellow in colour, and large enough to be plainly visible; the chorion or shell, when highly magnified, appearing sculptured in a manner shown by the photo at B. Their usual form is broadly ovate (see A), but being comparatively soft when first laid, and deposited whilst in this state between particles of soil, they consequently vary somewhat in shape.

Larva.—The fully grown larva (see Fig. D.) is pale yellow, reddish-brown above, with darker slightly raised irregular transverse marking on the back. The anal or last segment has curious prominent pro-legs, and its flattened upper surface is dark brown, closely dotted with white (see F on plate). Numerous short white hairs are scattered over the body; and the head and legs are light-brown. Length, 9 m.m (about three-eighths of an inch).

Pupa.—Pale yellow, with darker brownish-yellow eyes. Abdominal segments, conspicuous, somewhat ridged, and with a longitudinal row of short black hairs along sides, two rows of same close together down the middle of back, and a number of similar hairs on the thorax. Length, 7 m.m. (about a quarter of an inch).

The life-history was studied at this Department in 1909, when the following facts were noted:—

(1) Egg stage occupies from nine to ten days.

(2) Duration of larval stage, forty-one days (from 14th of March to 24th of April).

(3) The pupal stage was passed in the soil in an egg-shaped chamber excavated by the larva at depths varying from 1 to 3 in. (see Fig. H.).

(4) The larvæ were hatched from eggs laid on and under the surface of damp sand, and were transferred to the roots of a vegetable marrow plant grown for the purpose.

(5) Shortly before pupation, they were found to be tunnelling the bases of leaf stalks and boring the main stem, as shown at K.

REMEDIES.

Protection of Young Plants.—Young seedlings, when just above ground, are liable to be seriously damaged by pumpkin beetles, as at this stage a single beetle is able, in a few hours, to greatly injure or even kill a plant by devouring the tender shoot or crown between the seed-leaves.

It is a good plan to protect seedlings by covering them with mosquito netting or hessian until they have started into vigorous growth. Such covers can be supported by pieces of fencing-wire bent to the shape of half circles, or more simply by three or four short sticks stuck in the ground. The edge of the netting should rest on the earth and be covered with a layer of soil to prevent possible displacement by wind, and stop bettles from crawling under it.

A simple device for protecting young plants is described and figured in the "Queensland Agricultural Journal" for last March, page 196, and consists of a piece of crumpled paper, which is hung over a young vine and supported by a stick driven into the ground in an inclined position. It is asserted that the insects are kept off by the movements of the paper swinging in the wind.

Growers should make a practice of systematically examining young plants very early in the Spring and killing any beetles noticed, which at this time are far from plentiful, and can be easily destroyed by hand-picking. Such treatment is of the first importance and should never be neglected, as it tends to prevent the pest from accumulating, and by reducing the number of eggs laid in the vicinity greatly minimises the chances of an overwhelming attack by succeeding broods.

The Government Entomologist advises that "young plants should receive an application of some substance that will deter the insects' visitation to them," and remarks that, "in the absence of evidence yielded by experiment, any one of the following substances may be tried:—

(*a*) The refuse of acetylene gas manufacture.

(*b*) Ammoniacal gas water.

(*c*) Plaster or lime impregnated with turpentine, kerosene, or phenyl.

(*d*) Tobacco dust.

(*e*) Vaporite Strawson, apterite, or other such substance containing naphthalene.

These in each case to be sprinkled on the ground around the growing plant, but away from the stem, and only in such amount as to bestow a marked odour upon it."

In this connection it is worth mentioning that in 1911 a settler at Eumundi informed Mr. Tryon that he had found it a good plan to plant small pieces of carbide of lime with his pumpkin seeds.

Insecticidal and other Methods.—The following arsenical sprays, dry poisons, &c., have been advocated from time to time, and have proved more or less serviceable:—

> Spray the leaves with arsenate of lead (1 lb.) or Paris green and lime (¼ lb. of the arsenical to ½ lb. lime) in every 50 gallons of water.
>
> Dust the foliage with Paris green in the proportion of 1 lb. of the poison to 20 parts of flour or road dust; or, with flowers of sulphur and lime, 1 part of the former to 3 parts of lime.
>
> NOTE.—Dry powders may be sifted on to the leaves through a flour dredge or a bag made of cheese-cloth, and should be applied during still weather and preferably whilst the foliage is wet with dew.

When these insects occur in thousands on the plants, it pays to collect them by shaking or brushing them from the foliage into shallow pans containing a little water and kerosene. This method is best practised at early morning after a chilly night, or during a spell of exceptionally cool weather, whilst the beetles are inactive and disinclined to fly. An American entomologist, in referring to plant-eating beetles, says that "a remedy frequently advised, when insects occur on low-growing plants, is to dust the majority of them with sifted wood-ashes, road dust, or land plaster, and cover the remaining plants with a solution of Paris green or other arsenical in the proportion of ¼ lb. to about 60 gallons of water. The beetles will concentrate on the clean plants, where they will be killed by the poison, not always, however, before they have fed to such an extent that the plants will be more or less damaged."

Cultural Methods.—In some cases the covering of young seedlings could, perhaps, be avoided by early sowing or by raising the plants in cold frames so as to get them transplanted and well established before the first beetles appear. Planting an excess of seed is said to serve a like purpose by distributing attack, the hills being thinned out to the desired number after the first danger is past.

Although the larvæ, as before stated, will thrive well on pumpkin roots, it does not necessarily follow that they have a preference for this food.

I am inclined to believe that, under clean cultural conditions, the roots of cucurbitaceous plants seldom suffer attack, and that the eggs are usually deposited in open situations such as small clearings or headlands, where the vegetation is mainly herbaceous in character or the ground overgrown by weeds and grasses. Old vines and any that may have ceased to be profitable should, however, be pulled up, to avoid any possibility of the roots affording food for the larvæ; and it is hardly necessary to state that weeds must not be permitted to accumulate, as, in addition to providing food and shelter for a variety of noxious insects, they impoverish the crop, and thus render it less able to withstand the attacks of such enemies or of fungus diseases.

THE PLAIN PUMPKIN BEETLE.

(*Aulacophora wilsoni,* Baly.)

This beetle differs from the preceding in being slightly larger, more slender, and of a uniform pale yellowish-brown colour.

It was first noticed and described by Mr. Tryon in 1886 ("Report on Insect and Fungus Pests"), who, with reference to its habits, remarks:—"It is a very active insect, and readily takes wing when approached. It usually feeds upon the leaves of pumpkins and melons, and upon those of other cucurbitaceous plants, and may become quite a formidable pest."

At that time these fears seemed likely to be realised, as, in November of the same year, a farmer at Hughenden forwarded specimens of this beetle to the Agricultural Department, stating that they had completely destroyed all his pumpkins, melons, vines, and sweet potatoes, and had then attacked the cabbages.

In 1906 the insect was again recorded as being injurious to pumpkins and melons, &c., in the district of Burke, but during the last seven years its depredations have not warranted special mention.

This species is evidently a somewhat serious pest in the Northern portion of the State, but cannot be classed as such in Southern Queensland, although odd specimens are occasionally found near Brisbane feeding on cucurbitaceous plants in company with the common banded pumpkin beetle.

The remedial measures are the same as those given for *A. olivieri.*

NORTHERN BANDED PUMPKIN BEETLE.

Aulacophora (*cartereti*, Guérin).

This species, like *A. wilsoni,* is a Northern form, but resembles *Aulacophora olivieri* in general colouration.

In March, 1906, it was found to be seriously damaging pumpkins and melons in the Burketown district, and brought under the notice of the Government Entomologist, who presumed the beetle to be *A. cartereti* of Guérin, and recorded it as a pest for the first time.

Methods of control are similar to those advocated for the preceding insects.

THE 28-SPOTTED LADYBIRD BEETLE.

(*Epilachna 28-punctata*, Fabr.).

It is necessary to briefly allude to this species, which, although primarily a pest of solanaceous plants and known familiarly as the "potato beetle," frequently destroys the leaves of pumpkins and marrows.

The illustration given at M will enable growers to at once distinguish it from its occasional associate, the more common pumpkin beetle, from which, however, it differs but slightly in size. (Compare Figs. M. and J.) Like most of the typical ladybirds, the ventral or lower surface of this insect is flat, and the general shape of the body hemispherical. The species is widely distributed, and subject to considerable variation, but, generally speaking, is of a dull reddish-yellow colour, and marked with numerous black spots arranged after the pattern shown in the photo.

Its life-history is quite different from that of an *Aulacophora,* all stages, from egg to perfect insect, being passed above ground on the food-plant. Most farmers are familiar with the bright yellow spindle-shaped eggs of this beetle placed in little clusters on the leaf surfaces, and ultimately developing into sluggish dull yellow grubs covered with long prickles. The beetles do not skeletonise the leaves, but devour the softer portions only, leaving the withered membrane intact, but scarred with short lines that are more or less parallel to each other and arranged in little rows, each of which occupies a different position from that of the adjoining row.

The remedies already advocated for *Aulacophora olivieri* apply also to this beetle.

COMBATING THE BEAN FLY.

Referring to an article on the Bean Fly, by Mr. E. Jarvis, Assistant Government Entomologist, which appeared in the March issue of this journal, Mr. R. J. Scott, of Wanda, Walla, wrote to the "Brisbane Courier" as follows:—

"My first experience of this fly in the Brisbane district was in the autumn of 1893-4, ten years before the dates mentioned in the above article, and I would like to add for the information of unfortunate growers my plan for combating the fly. Say four days after planting the seed, cover the rows with a light layer of sawdust, then wet this with a dressing of kerosene emulsion with an ordinary watering can. When the plants are in the second leaf, again dress with the emulsion. To make kerosene emulsion I use 1 lb. of ordinary soap, cut up and dissolved in, say, 2 gallons of boiling water. When dissolved, add cold water to 4 gallons and three-quarters of a pint of kerosene, well stirred with a thin flat board, say, 4 in. wide. The emulsion must be warm when used, and kept well stirred."

The remedy here given is very simple, and is well worthy of trial by farmers and market-gardeners, who frequently suffer the loss of an entire crop owing to the ravages of this fly.

General Notes.

HOW DAIRY SHORTHORNS PAY IN NEW ZEALAND.

A Papakura (New Zealand) dairyman, with a herd of 45 Shorthorns, received last season £589 10s. from butter fat, £107 5s. from calves, and £40 from pigs, or a total of £737 5s., equal to an average of over £16 per cow for the season. This is an excellent return, and shows the Shorthorn in a very good light as a dairy cow.

HOW FAR A SWALLOW CAN FLY.

An adult swallow marked with "British Birds" ring No. B830 by Mr. J. R. B. Masefield, at Rosehill, Cheadle, Staffordshire, on 6th May, 1911, was caught on 23rd December, 1912, in a farmhouse 18 miles from Utrecht, Natal. The distance is about 7,000 miles.

The above items are taken from "The Live Stock Journal," London, 7th February, 1913.

ANOTHER GOOD BANANA RECIPE.

BAKED BANANAS WITH ORANGE DRESSING.

Peel bananas, dredge with flour and sugar, and bake in a moderate oven for one half hour. Heat the juice of 3 oranges and 1 lemon, add 1 cup of sugar and 1 teaspoonful of cornflour starch, mixed smooth with cold water. Stir well and cook 5 minutes. Pour over bananas; set back in the oven for a few minutes; then serve hot.

DIRT-PROOF TANK.

A correspondent sends the following ingenious idea for preventing dirt and poisonous matter from entering a house tank:—

" I suggest this addition to Mr. Molle's very excellent tank, shown in the April number of the 'Queensland Agricultural Journal' :—

" Fig. 1.—A, elbow of down pipe from roof; B, to tank; C, to receiver for dirty water; D, overflow from C. The water, coming slowly at the beginning of a shower, fails to reach B and falls into C.

" Fig. 2.—The position of B and C on top of tank.

" Heavy dew deposits enough water on a galvanised iron roof to wash the dust on the roof into the tank. This arrangement prevents that, as the water, coming slowly, falls into C.

" Dew also washes the oxide of zinc off the galvanised iron, and that by this plan is carried into C.

"When there is plenty of water in the tank to dilute the oxide of zinc, it does little harm.

"During dry weather, when there is heavy dew, and very little water in the tank, the solution of zinc becomes so strong as to become poisonous. It acts by stopping the flow of saliva in the mouth, the want of saliva causes indigestion, and, that being treated with medicine while still drinking the same zinc-loaded water, the patient often has a very serious illness, the doctor not suspecting the cause.

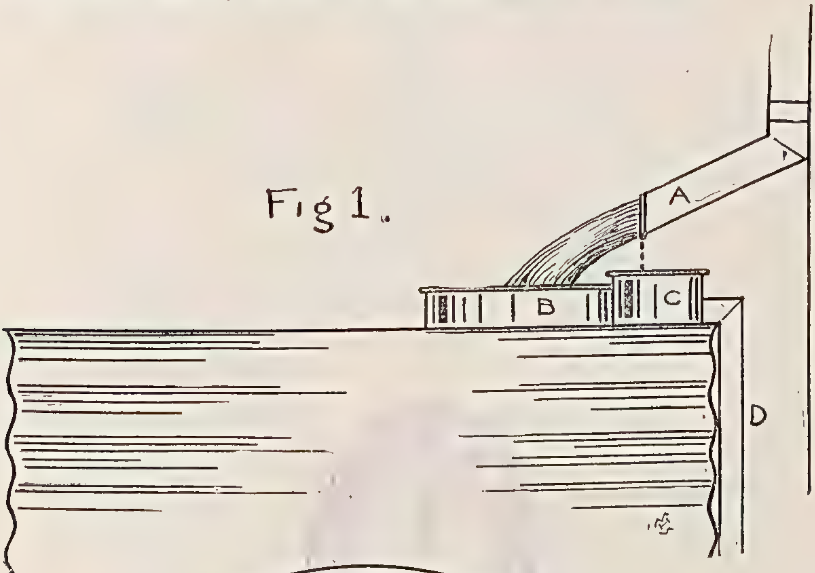


Fig 1.

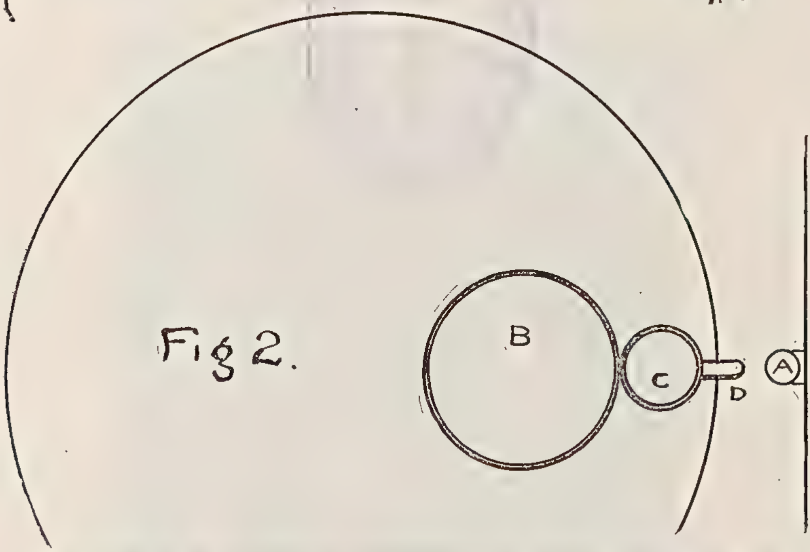
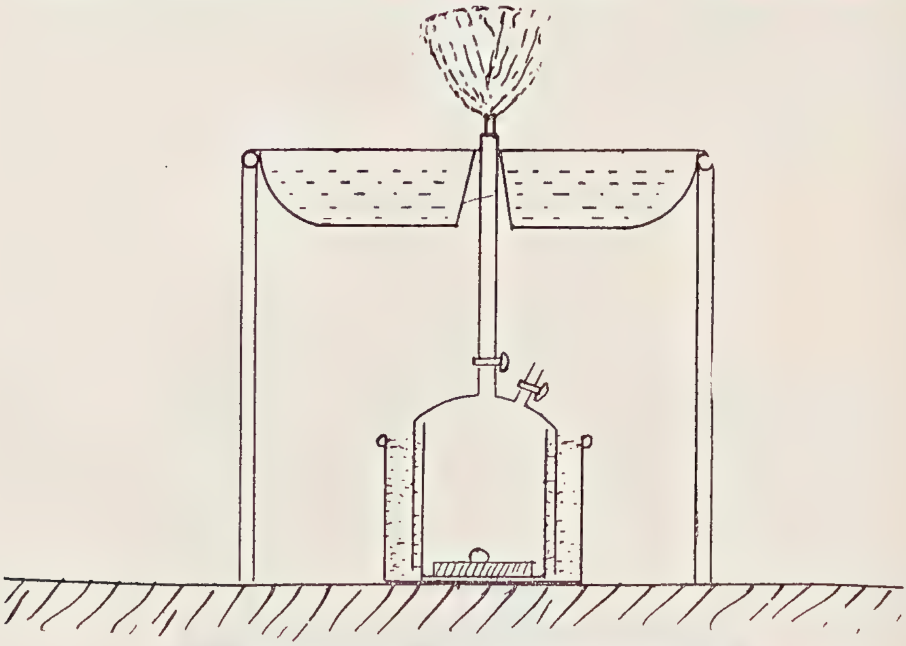


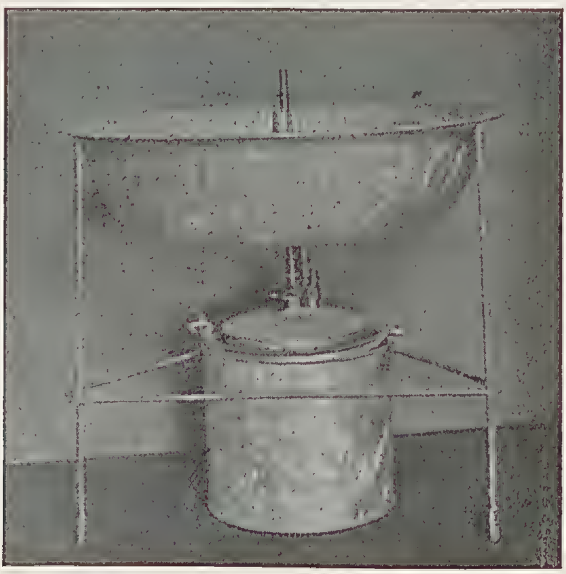
Fig 2.

"I have had the above arrangement on my tank for about five years. A shower puts about a gallon of water into the dirty water receiver; that water is used for other purposes than cooking. The gutter, from the roof, may be arranged to discharge into the strainer on the tank, the end of the gutter being set far enough back to allow the first water of a shower to fall into a gutter, which will convey it to the dirty water receiver. The arrangement is applicable to all tanks."

ACETYLENE MOTH TRAPS.

Various devices have been tried for the destruction of moths injurious to citrus fruits and other products. In 1908 an acetylene moth trap, shown in the illustration, was devised by Mr. W. J. Strachan, of Wooloowin. Of this trap the late Mr. R. W. Thurlow said that it proved





a perfect success, he having caught thousands of moths with it. He recommends it to anyone growing fruit or vegetables. Another gentleman who purchased one states that it destroys effectually the cabbage, tomato, and other moths. If this trap, which can be purchased for £1, will effect the destruction of the pumpkin beetle, it would be of immense value.

Answers to Correspondents.

GROWING ASPARAGUS FROM SEED.

"Market Gardener," Toowoomba—

Why spend two years in raising a crop which you can do in one year? You will not get any return from seedlings for over two years—perhaps, not under three years; whereas, if you plant crowns, which can be obtained from most nurserymen, at the latest you will get your first crop in fifteen months or even in twelve months if all conditions are favourable, such as deep trenching (to 2 or 3 ft.), well-manuring with farmyard manure, old cow or horse manure, rotten straw, bones, and a good sprinkling of coarse salt. The bed should then be left for a month or two to allow the rain and atmosphere to act upon it; and then, before planting, give another good dressing of well-rotted manure, trench again to a depth of from 2 to 6 ft., sprinkle once more with salt, and leave the surface level. If properly prepared, such a bed will last seven years.

If you wish to experiment with seed, sow it in drills 1 ft. apart, in a deep rich soil. When the seedlings send up a second shoot, thin out to 1 ft. in the rows. Keep the bed well stirred and clear of weeds for the first year. In the second year apply a heavy dressing of manure, and weed and stir the soil as in the previous year. In dry weather, water copiously. When the plants are two years old, you can begin to cultivate for a third year, or dress the bed for a crop. Trim off the plants, removing all old stalks, and fork the bed carefully, so as not to injure the roots. Then spread on it a layer of rich stable manure 18 in. deep, and press it down compactly. Keep well weeded, and in due time the little button-like heads will appear; and when they do, remove the soil sufficiently to enable you to cut off the sprouts close down to the crown with a long table knife. Then replace the soil.

By planting crowns you avoid most of this two or three years' labour.

NUT GRASS.

R. W. Andrews, Bowen—

We have been repeatedly asked to furnish a remedy for nut grass, but have been unable to do so. Some arsenical poison might be helpful, but, as the nuts are found as deep as 2 ft. in the ground, such large quantities would have to be used that the land would be rendered quite useless for perhaps years, and the expense would be prohibitive. A large flock of turkeys is more serviceable in destroying the grass by constant grazing than any poison. See issue of this journal for July, 1912.

DESTROYING STUMPS.

"STUMPS," Degilbo—

We do not advise the use of chemicals. See warning in this issue of the Journal concerning the danger of the method.

GRAFTING ORANGES AND LEMONS.

E. A. TANNER, Chinchilla—

1. Lemons may be grafted or budded on orange stocks with reasonable prospects of success, but oranges to lemon stocks are not recommended. Each to their own kind is preferable.

2. Grafting should be performed in early spring, when the sap is rising. Budding may be done at any time during the growing season, when the bark is easily parted from the stock.

3. Apply to Mr. J. F. Bailey, Director of the Brisbane Botanical Gardens, for seed of the cork tree, or to the State Nursery, Kamerunga. There have been no recent introductions by this Department.

The Markets.

PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR APRIL, 1913.

Article.		APRIL. Prices.
Bacon, Pineapple	lb.	9d. to $10\frac{1}{2}$d.
Bran	ton	£5 15s.
Butter	cwt.	94s.
Chaff, Mixed	ton	£3 to £5
Chaff, Oaten (Victorian)	,,	£4 to £6 10s.
Chaff, Oaten (Local)	,,	...
Chaff, Lucerne	,,	£3 15s. to £6 5s.
Chaff, Wheaten	,,	£5
Cheese	lb.	4d.
Flour	ton	£8 10s.
Hay, Oaten (Victorian)	,,	£6 15s. to £7
Hay, Lucerne	,,	£4 15s. to £5
Honey	lb.	$2\frac{1}{2}$d. to 3d.
Maize	bush.	3s. 6d. to 3s. 9d.
Oats	,,	4s. to 4s. 3d.
Pollard	ton	£5 15s.
Potatoes	,,	£8 to £9
Potatoes, Sweet	cwt.	2s. 6d. to 3s. 4d.
Pumpkins	ton	£2 10s. to £3 5s.
Wheat, Milling	bush.	3s. to 3s. 6d.
Onions	ton	£9
Hams	lb.	1s.
Eggs	doz.	1s. 1d. to 1s. 2d.
Fowls	pair	3s. to 4s.
Geese	,,	6s. 6d.
Ducks, English	,,	3s. to 3s. 6d.
Ducks, Muscovy	,,	5s. to 5s. 9d.
Turkeys (Hens)	,,	7s.
Turkeys (Gobblers)	,,	12s. to 15s.

SOUTHERN FRUIT MARKETS.

Apples (Choice—local), per bushel case	7s. to 8s.
Apples (Tasmanian), per bushel case	5s. to 6s.
Apples (Cooking), per gin case	6s. to 7s.
Apricots, per half-gin case	...
Bananas (Fiji), G.M., per case	14s. to 15s. 6d.
Bananas (Fiji), G.M., per bunch	4s. to 10s.
Bananas (Queensland), per bunch	...
Bananas (Queensland), per case	6s. to 12s.
Cherries, per 12-lb. box	...
Cocoanuts, per dozen	2s. 6d. to 3s.
Lemons (local), per gin case	8s. to 10s.
Lemons (Italian), per case	...
Mandarins (Emperor), per case	...
Mangoes, per bushel case	...
Nectarines, per case	...
Oranges (Navel), per gin case	...

SOUTHERN FRUIT MARKETS—*continued.*

Article.	APRIL. Prices.
Oranges (other), per case	7s. to 10s.
Papaw Apples, per bushel case	...
Passion Fruit, per half-case	2s. 6d. to 7s.
Peaches, per quarter-case	5s. to 7s.
Peanuts, per lb.	5d. to 6d.
Pears, per gin case	6s. to 8s.
Persimmons, per gin case	3s. 6d. to 4s.
Pineapples (Queensland), common, per case	8s. to 10s.
Pineapples (Queensland), Ripley's, per case	10s. to 12s.
Pineapples (Queensland), Queen's, per case	10s. to 12s.
Plums, per case	5s. to 6s.
Quinces, per gin case	...
Rockmelons (Queensland), per half case	...
Tomatoes, per half-case	2s. to 4s.
Cucumbers (Local), per bushel case	3s. to 4s. 6d.
Watermelons, per dozen	4s. to 10s.

PRICES OF FRUIT—TURBOT STREET MARKETS.

Article.	APRIL. Prices.
Apples (Eating), per case	6s. to 9s.
Apples (Cooking), per case	6s. 6d. to 9s.
Apples (American)	...
Bananas (Cavendish), per dozen	2d. to 3½d.
Bananas (Sugar), per dozen	1½d. to 3d.
Custard Apples, per case	3s. 6d. to 7s.
Grapes, per lb.	...
Lemons (local), per case	4s. to 7s.
Lemons (Italian), per case	...
Mandarins, per case	3s. to 3s. 6d.
Mangoes, per case	...
Nectarines, per case	...
Oranges (Navel), per case	...
Oranges (other), per case	3s. to 4s. 6d.
Papaw Apples, per case	...
Passion Fruit, per quarter-case	2s. 6d. to 3s. 6d.
Peaches, per quarter-case	2s. to 4s. 6d.
Peanuts, per lb.	3d. to 4d.
Persimmons, per case	2s. to 3s.
Pineapples (Ripley), per dozen	2s. to 4s.
Pineapples (Rough), per dozen	1s. to 3s.
Pineapples (Smooth), per dozen	1s. 6d. to 3s. 6d.
Plums, per case	...
Rockmelons, per doz.	...
Strawberries, per tray	3s. 6d. to 4s. 6d.
Tomatoes, per quarter-case	9d. to 3s. 6d.

TOP PRICES, ENOGGERA YARDS, MARCH, 1913.

Animal.	MARCH. Prices.
Bullocks	£8 12s. 6d. to £9 10s.
Cows	£6 5s. to £6 17s. 6d.
Merino Wethers	19s. 6d.
Crossbred Wethers	22s. 6d.
Merino Ewes	15s. 6d.
Crossbred Ewes	18s. 9d.
Lambs	16s. 9d.
Pigs (Porkers)	...

FENWICK & Co., Salesmen, Brisbane, report under date 8th April:—

SUNDRIES.—No sales this week.

MARSUPIAL SKINS.—We offered a nice catalogue, and found the demand keen for all lines. Wallabies were firm with values for small skins inclined to be dearer. Very small skins realised 13s. 9d. to 15s. per dozen; small from 16s. 9d. to 19s. 9d.; medium from 14s. 9d. to 19s.; and large from 20s. to 24s. per dozen. Kangaroos, wallaroos, whiptails, and goat skins realised last sale's rates with an occasional advance on picked lines of the first two. Grey kangaroos sold to 98s.; reds to 90s.; whiptails to 36s.; and goat skins to 48s. per dozen. We sold 5,463.

HIDES.—Owing to a dispute with a section of the buyers, a large proportion of the offerings were withdrawn. Sales that were effected generally showed a decline of ⅛d. in sympathy with the drop in Southern and Oversea markets. Stout heavy hides sold well, and we realised to 13⅜d. per lb. for a hide sold on account of E. Boland, Esq., Toowoomba. We sold 1,888.

All CALFSKINS AND YEARLINGS were in good demand at the best of late rates. We sold 1,059.

SHEEPSKINS.—Competition ruled keen at Friday's sale, but late extreme rates were not paid for shortwools and values for these were ¼d. lower, while pelts declined fully ½d. Other lengths were in very keen demand. We sold 2,227.

TALLOW.—Under very keen competition prices were forced above true value, and prime tallow realised £30 17s. 6d. We sold 74 tierces and 3 quarter casks.

Orchard Notes for June.

THE SOUTHERN COAST DISTRICTS.

The Notes of last month, referring to the care to be taken in the handling and marketing of all kinds of citrus fruits, apply with equal force during this and subsequent months till the end of the season.

Keep the orchard clean, and work the land to retain moisture. The handling of the citrus crop is the main work in many orchards, but where slowly acting manures are to be given their application should not be later than this month. They should be well mixed with the soil, so that when the Spring comes and the trees start a fresh growth a certain percentage of plant food will be available for the trees' use. Heavy pruning should be done now, whilst the trees are dormant. All large limbs should be cut off close to the main stem; the edges of the cuts should be carefully trimmed, and the whole wound, if of large size, covered with paint or grafting wax, so that it will not start to decay but soon grow over. When the soil of the orchard is becoming deficient in organic matter, the growing of a Winter green crop, such as mustard or rape, is well worth a trial. Clear the crop of fruit from the part of the orchard to be so treated. Plough the land well; work the soil down fine so as to get a good seed bed, and broadcast the mustard or rape. A manuring of 4 cwt. of meatworks manure and 1 cwt. of sulphate of potash per acre will produce a very heavy crop of green manure, and the plant food not required for the production of such crop will be still available for the trees' use in Spring.

Pineapples and bananas should all be cleaned up, and the land got into first-class order. Pineapples, where at all liable to frost, should be covered with grass or other suitable material. The growth of weeds between the rows of pines on land liable to frost is one of the best ways of encouraging frost, as frost will strike dirty, weedy ground, and injure the pines growing thereon severely, when it will do little, if any, damage where the land is kept perfectly clean—another advantage of cleanliness in cultivation.

THE TROPICAL COAST DISTRICTS.

Keep the land well cultivated—plough when necessary to bury weed growth, and get the surface of the ground into a state of thorough tilth, as moisture must be retained in the soil by cultivation to mature the Spring crop of fruit. This applies not only to oranges and other tree fruits, but to bananas and pines as well. A good start in Spring means good bunches of bananas and early-ripening pineapples. Heavy pruning can be done now in the case of all trees not carrying a heavy crop of fruit; but where citrus trees are heavily loaded, the pruning should be put off till after the Spring crop of fruit has been gathered. The spraying of the trunks and inside of the trees with the lime and sulphur wash can be carried out, and where Maori is making its appearance the sulphide of soda wash should be used as well.

THE SOUTHERN AND CENTRAL TABLELANDS.

The pruning of all kinds of deciduous fruit trees is the chief work of the month in the Stanthorpe district. Do not be frightened to prune severely—first, in the case of young trees, so as to get strong well-grown trees instead of straggling top-heavy trees; and, second, in the case of trees that are going off in the size and quality of their fruit. Where peaches, apricots, plums, or nectarines are only making very little new growth, and that weak, so that the fruit produced thereon is small, it is advisable to head the tree hard back, so that it will throw out some vigorous branches in Spring that will form a new head for the tree. Apples, as well as plums and apricots, are sometimes inclined to over-produce fruit spurs, which become long and straggling, and bear a large quantity of small-size fruit. A vigorous shortening back and cutting out of such spurs will have a very beneficial effect in the quality and size of the fruit produced.

Gather and burn all prunings; and where codlin moth is present in the orchard, examine the tree carefully when pruning it, so as to see if there are any cracks, crevices, or masses of loose bark in or under which the larvæ of the moth may be hibernating. All larvæ so found should be destroyed, and if the work is carried out systematically it will tend to materially decrease the crop of moths that will hatch out the following Spring.

As soon as any part of the orchard is pruned, gather up the prunings and work the land, as a thorough winter weathering of the soil is very beneficial in its effects; and, further, it will tend to destroy many insects that may be wintering in it. The planting of new orchards or of trees to replace any that may have died, or that have been proved to be unsuitable to the district, may be continued during the month, and right on till the end of Winter.

Do not prune vines in the Stanthorpe district, as it is advisable to leave the pruning as late as possible, but vine-pruning can be done at any time now in the Roma or Central districts. Tree-pruning can be continued during the month, and the orchard should be kept well worked. Citrus fruits can be marketed. Lemons should be gathered and cured.

Farm and Garden Notes for June.

Field.—Winter begins on the 24th of this month, and frosts will already have been experienced in some of the more exposed districts of the Southern coast and on the Darling Downs. Hence insect pests will, to a great extent, cease from troubling, and weeds will also be no serious drawback to cultivation. The month of June is considered by the most successful lucerne-growers to be the best time to lay down this crop, as any weeds which may spring up in the event of a dropping season will be so slow-growing that the young lucerne plants will not be choked by them.

The land should now be got ready for millets, sorghums, panicum, &c. Oats, barley, vetches, clover, tobacco, buckwheat, field carrots, and Swedes may now be sown. Some advocate the sowing of early maize and potatoes during this month, but obviously this can only apply to the more tropical parts of Queensland. The land may be got ready, but in the Southern districts and on the tableland neither maize nor potatoes should be planted before August, or at the earliest, in warm early districts, at the end of July. There is always almost a certainty of frosts, more or less severe, during these months. Arrowroot will be nearly ready for digging, but we would not advise taking up the bulbs until the frosts of July have occurred. Take up sweet potatoes, yams, and ginger. Should there be a heavy crop, and consequently a glut in the market, sweet potatoes may be kept by storing them in a cool place in dry sand, taking care that they are thoroughly ripe before digging. The ripeness may be known by the milky juice of a broken tuber remaining white when dry. Should the juice turn dark, the potato is unripe, and will rot or dry up and shrivel in the sand pit. Before pitting, spread the tubers out in a dry barn or in the open, if the weather be fine. In pitting them or storing them in hills, lay them on a thick layer of sand; then pour dry sand over them till all the crevices are filled and a layer of sand is formed above them; then put down another layer of tubers, and repeat the process until the hill is of the requisite size. The sand excludes the air, and the potatoes will keep right through the Winter. Late wheat may still be sown, but it is too late for a field crop of onions. In tropical Queensland the bulk of the coffee crop should be off by the end of July. Yams may be unearthed. Cuttings of cinnamon and kola-nut tree may be made, the cuttings being planted under bell glasses. Collect divi-divi pods and tobacco leaves. English potatoes may be planted. The opium poppy will now be blooming and forming capsules. Gather tilseed (sesame), and plant out young tobacco plants if the weather be suitable. Sugar-cane cutting may be commenced. Keep the cultivator moving amongst the pineapples. Gather all ripe bananas. Fibre may be produced from the old stems.

KITCHEN GARDEN.—Cabbage, cauliflower, and lettuce may be planted out as they become large enough. Plant asparagus and rhubarb in well-prepared beds in rows. In planting rhubarb it will probably be found more profitable to buy the crowns than to grow them from seed, and the same remark applies to asparagus.

Sow cabbage, red cabbage, peas, lettuce, broad beans, carrots, radish, turnip, beet, leeks, and herbs of various kinds, such as sage, thyme, mint, &c. Eschalots, if ready, may be transplanted; also horse-radish can be set out now.

The earlier sowings of all root crops should now be ready to thin out, if this has not been already attended to.

Keep down the weeds among the growing crops by a free use of the hoe and cultivator.

The weather is generally dry at this time of the year, so the more thorough the cultivation the better for the crops.

Land for early potatoes should now be got ready by well digging or ploughing.

Tomatoes intended to be planted out when the weather gets warmer may be sown towards the end of the month in a frame where the young plants will be protected from frost.

FLOWER GARDEN.—No time is now to be lost, for many kinds of plants need to be planted out early to have the opportunity of rooting and gathering strength in the cool moist Spring time to prepare them for the trial of heat they must endure later on. Do not put your labour on poor soil. Raise only the best varieties of plants in the garden; it costs no more to raise good varieties than poor ones. Prune closely all the hybrid perpetual roses; and tie up, without pruning, to trellis or stakes the climbing and tea-scented varieties, if not already done. These and other shrubs may still be planted. See where a new tree or shrub can be planted; get these in position; then they will give you abundance of Spring bloom. Renovate and make lawns, and plant all kinds of edging. Finish all pruning. Divide the roots of chrysanthemums, perennial phlox, and all other hardy clumps; and cuttings of all the Summer bedding plants may be propagated.

Sow first lot, in small quantities, of hardy and half-hardy annuals, biennials, and perennials, some of which are better raised in boxes and transplanted into the open ground, but many of this class can, however, be successfully raised in the open if the weather is favourable. Antirrhinum, carnation, picotees, dianthus, hollyhock, larkspur, pansy, petunia, *Phlox Drummondii*, stocks, wallflowers, and zinnias, &c., may be sown either in boxes or open beds; mignonette is best sown where it is intended to remain.

To grow these plants successfully, it is only necessary to thoroughly dig the ground over to a depth of not less than 12 in., and incorporate with it a good dressing of well-decayed manure, which is most effectively done by a second digging; the surface should then be raked over smoothly, so as to remove all stones and clods, thus reducing it to a fine tilth. The seed can then be sown in lines or patches as desired, the greatest care being taken not to cover deeply; a covering of not more than three times the diameter of larger seeds, and a light sprinkling of fine soil over small seeds, being all that is necessary. A slight mulching of well-decayed manure and a watering with a fine-rosed can will complete the operation. If the weather prove favourable, the young seedlings will usually make their appearance in a week or ten days; thin out so as to leave each plant (if in the border) at least 4 to 6 in. apart.

QUEENSLAND AGRICULTURAL JOURNAL

VOL. XXX. JUNE, 1913. PART 6.

Agriculture.

MIXED FOOD FOR STOCK.

Where maize and lucerne are grown on the farm, dairy cattle require no additional food as a ration. For cows in good milk about 4 lb. to 5 lb. per day of steamed, crushed maize mixed with cane tops form a good ration; also, beanmeal in the same proportion will be found suitable. For horses the usual food given on farms and in towns is maize and lucerne or oaten hay and chaff. An excellent food for horses is pumpkins and barley. Like human beings, stock always thrive best on a mixed diet—that is, as great a number of suitable kinds of food as possible should be used in making up a balanced ration. Horses fed exclusively on maize and chaff are liable to suffer from "old man asthma," which is a sort of broken wind brought on through the bad system of feeding cut chaff with the grain. There should be a moderate use of condimental preparations, but salt especially should be within reach. The reason appears to be that the digestibility is increased where there is a mixture, while the palatability is improved where condiments and salt are used. We find with ourselves that our food is much more agreeable when there is a variety, and where pickles, spices, &c., are used.

Besides this, the preparation of the food is of importance in lessening the work of digestion, and in furthering the assimilation of a greater amount of nutriment out of a given quantity of material. For this reason, it pays to chaff the whole or a part of the fodder, slice or pulp the roots or pumpkins, bruise or grind up the grain, break the cake, and

cook or steam various mixtures. An example will show the benefit thus derived. If a horse is fed with maize "neat," the grains will be found to pass through him more or less whole—a dead loss as food stuff. If, however, they are bruised or mixed with chaffed hay, so as to compel him to masticate them thoroughly, then the digestive secretions (saliva, gastric juice, bile juice, &c.) can attack and dissolve every particle so that there is no water. Cooking or steaming does not increase the digestibility, but it improves the palatibility, and thus allows of the use of waste corn, musty hay, &c.; while warm food is beneficial to stock during cold weather, as it saves the waste of heat-producers, which must otherwise be used up in excess. Blood heat (say 100 degrees Fahr.) is the most suitable temperature.

Those whose business entails the use and raising of different kinds of stock know, by practical experience, that certain foods are more suitable to a given kind of stock than others. Thus, for horses, lucerne and maize or oats are best, whilst wheat and even barley are unsuitable or even dangerous; artificial grasses or some of our valuable bush grasses are most suitable for cattle and sheep. Cotton-seed oil cake is dangerous for calves, linseed cake being most suitable; for pigs, pollard, maize, bran, and barley meal with green forage. As for salt, it has been stated by veterinary surgeons in England and America that salt should never be given to pigs, salt and alkaline substances being poisonous in their case. Skim-milk is an essential in pig-raising, as is also a good run on lucerne. In the United States, Denmark, and Germany, skim-milk enters largely into the ration of all pigs from 20 lb. to 180 lb. in weight. For pigs from two to six months old the American ration is:—Maizemeal, 3 to 5 lb. per head per day, with lucerne forage or pasture. Generally, the kind of food given to farm animals has to depend on the kinds grown on the farm or most cheaply purchased in the market; but those selected should, as far as possible, be in accordance with the known suitability of each food to each class of animal.

As regards water, a sheep requires 2 lb. of water to every 1 lb. of dry food; a horse, 3 lb. to 1 lb.; a bullock, 4 lb. to 1 lb., more or less, according to circumstances. In a damp climate sheep are able to absorb all the water they require through the wool and skin. In America it has been found by experiment that cows require about 5 lb. of water for every 1 lb. of milk yielded. A horse at work requires 10 gallons or even more per day in summer, and this he should be allowed to take at intervals of two or three hours.

As to salt, the safest plan with all kinds of stock is to allow the animals access to rock salt both in stall and field, and they will then only take what they need.

GRASSHOPPERS.

Mr. R. Jarrott, Manager of Gindie State Farm, writes on this subject:—

A great part of this district has been overrun with this plague this season, and in some instances, in the early part of the summer, a considerable amount of damage was done on some properties. Fortunately

nice showers fell in many parts of the neighbourhood which kept the grass growing, so that the damage done by this pest was not felt as keenly as would have been the case had the season been less favourable.

In our immediate neighbourhood we were assisted in the destruction of the hoppers by a large flock of ibis, and no doubt they destroyed an immense number.

We procured some 30-in. calico and tacked light pine slats to it at about 12 ft. intervals. One end of the slat was sharpened so that it could be forced in easily. One edge of the calico was kept flush with the top of the peg. At the bottom the calico was tacked on 4 in. above the lower edge, which gave that amount of loose material when the pegs were forced into the ground.

A few stones or some earth placed on this loose flap prevents the hoppers from getting beneath it.

When the slats have been attached to a sufficient length of calico, it is best to roll it up from each end with the slats inside. Then when the calico is required the centre peg can be put in the ground and the calico run out quickly, forming an equal length of wing with the slats outside. If they are inside, the hoppers climb up them.

When the hoppers are big and in large numbers, we found it best to use a few sheets of iron at the end of the drive. They cannot climb the iron, but they do crawl up the calico when in large numbers, and, of course, the object of driving them is to get a large number in as small a space as possible, thereby saving the spraying material and at the same time making their destruction sure.

We tried various sprays, but the only two that I could recommend are kerosene emulsion—1 part of the former to 1 of water, and Sunlight soap, 1 lb. of soap to a kerosene tin of water.

[TO BE CONTINUED.]

SUBSOILING BY DYNAMITE.

In response to a request for information as to how long the effects of subsoiling by dynamite will last, Mr. R. B. Howard has furnished the result of his and of American experience in this regard. He says:—

"Some five years since I used the dynamite to drain a small depression or swamp, which, previous to using the explosive, was always very wet—in fact, quite a morass. So far, the place has drained well, and, apparently, the fractures have not silted up. Again, I understand that in Victoria similar operations to those carried out by me were performed some ten years ago, and, so far, it has not been found necessary to renew the work. In America, from what I can gather from the various publications, it would appear that no attempt has been made to renew the operation, although, in some instances, the explosives had been used fifteen years previously. Personally, I hold the opinion that the constant percolation of the water will, in most kinds of soil, be sufficient to keep the soil open for very many years. Of course, in the case of fruit or other

trees the roots would assist in maintaining the drainage caused by the explosive. The practice followed out by me when subsoiling is to use the explosive once only, and, if properly carried out, I do not think it would be necessary to repeat the operation for at least ten years, and probably for a much longer period.

"I would advise those seeking for information in regard to the use of explosives for agricultural purposes to obtain some of the agricultural reports issued by the American Agricultural Colleges."

[The U.S. Department of Agriculture, Washington, always answer promptly any such inquiries.—Ed. "Q.A.J."]

EXPLOSIVES AS AN AID TO AGRICULTURE.

A correspondent of the "Planters' Chronicle," Bangalore, India, gives the following brief account of some experiments he witnessed on a neighbour's property:—

"No. 1.—A piece of ground was being levelled for the purpose of making tennis lawns. At one end a cutting of 2½ ft. had to be made, and the earth carried along and put at the other end. Instead of cutting the earth by means of manual labour, explosives were used; and I was assured that three cartridges were put into a hole made with a crowbar about 2½ ft. deep, at intervals of about 6 ft. either way, and the holes were filled with earth, and rammed down, a fuse attached to a cartridge being left about 1 ft. out of the ground. This was lit, we retreated to a safe distance, and in about two minutes the explosion took place. The report was not so loud as I anticipated, and the earth was not thrown up any distance, but it was thoroughly disintegrated, and in a state to be easily shovelled into the wheelbarrow.

"No. 2.—The next objective was the stump of a fair young oak measuring 4 to 5 ft. in circumference at the base—a rough trench had been made round the stump, and some of the lateral roots cut to give access underground for the insertion of the explosive. The cartridges, amounting altogether to 1¼ lb. of cheddite, were packed tight in a tin (the greater the compression the more effective the explosion), and the tin was shoved into a hole as near the centre of the stump as could be reached. It was then rammed tight, the fuse lit, and in a minute or two the explosion occurred. The report was louder this time, there being more resistance, but nothing was thrown any distance. On inspection we found that half the stump was blown clean out of the ground, and the foundations of the remaining half so shaken that removal by hand was no longer a matter of much difficulty.

"No. 3.—We next tackled a large elm stump which must have measured 9 to 10 ft. in circumference, and which required three separate explosions to effectually uproot it. For the first 1¾ lb. of cheddite were rammed down, which blew a considerable portion out of the ground. and caused a general shattering—a second charge of about 1 lb. disposed of a good piece more, but a third was necessary, as what remained was

still pretty firm in the ground. This was inserted in a very favourable position and in close contiguity to the stump itself. The result was a great commotion; chunks large and small flew in all directions—some 50 to 60 ft. high, some to a distance of 30 or 40 yards. We had been inclined to think our host over-cautious in insisting on our standing at what he considered a safe distance—this time we appreciated his care. The result of the experiments was pronounced very satisfactory, and the actual cost of the powder used said to be only about 3s.; so it would look as if the estimate of cost given in my previous letter might be excessive. A few carefully conducted experiments would soon determine this. There is no doubt the work is most effectually done when explosives are used—and I think the system, in spite of cheap labour, might be resorted to in India in connection with some works with great advantage."

THE BREEDS OF LIVE STOCK IN GREAT BRITAIN.

The Board of Agriculture (London) recently took a census of the breeds of live stock in Great Britain, and the results obtained are most unexpected in some cases, while interesting in all. Many of those who filled up the returns did not specify the breeds distinctly enough, but used such phrases as "cart horses," "Irish cattle," and so on; but the enumerators had no trouble in classifying these, and the figures arrived at are near enough for practical purposes.

Taking round figures only, and leaving out the odd hundreds, there are 369,000 Shires, 203,000 Clydesdales, and 12,000 Suffolks in existence, showing a considerable preponderance of the Shire breed.

Among cattle the Shorthorn easily heads the list with over 4,000,000 head, or equal to 64 per cent. of the entire cattle stock of the country, and this without including the Lincoln Red Shorthorns, or the "Irish" cattle, which would be mostly Shorthorns.

A surprising fact brought out, however, is that the Devon cattle come next in numbers. Many people outside of the South and West of England have never seen these animals at all, and, indeed, there are many farmers who have never even heard of them, yet they come second in order of the breeds as far as numbers are concerned.

Next in order come Ayrshires, Herefords, Welsh, and Aberdeen-Angus, in the order specified; while the Channel Islanders are very low.

Among sheep the Scottish Blackface is top, with 5,500,000; next comes the Cheviot, with 2,500,000; Welsh close behind the Cheviots, and then the Lincolns, Hampshires, and Shropshires. Twenty-nine breeds of sheep were enumerated.

The Large White tops the pig census, with the Berkshire second. Then the Middle White, Large Black, and Lincoln, with Tamworths last. Many people think that the Small Whites have died out, but 158,000 were returned, and over 50,000 Small Blacks are still in existence, so there is not much sign of decadence yet in these small kinds.

A NEW PLOUGH.

Orchardists and horticulturists in general have long been looking for a special plough adapted to small fields, orchards, and plantations, where the heavy traction or cable ploughs are not serviceable. It now appears that there is an English patent out for a motor-propelled plough which will probably revolutionise many agrarian practices. This new motor plough is fitted with a 4-horse power engine and cuts a furrow at the rate of about 5 kilometres per hour. The cost of fuel is a negligible quantity, being only some 1·50 pesos per day—which, of course, leaves horse-ploughing away behind. The plough itself weighs only a little over 300 kilos. A cultivator may be attached to the plough, so that it can be used in orchards and small fields to excellent advantage.

A very interesting feature of the plough is that it is more or less automatic. Like some of the larger-power ploughs it has a self-guiding apparatus; so that after the first furrow is made the plough need only be started and it will automatically cut the next furrow. Theoretically, then, if the field was a large circular one, the farmer could make the first furrow on the motor, then get off and leave the plough to *finish the field itself.*—"Philippine Agricultural Review."

WATER SUPPLY TO FARMS.

BY ARTHUR MORRY, Surveyor, Department of Agriculture and Stock.

SPRINGS AND SUBTERRANEAN SUPPLIES.

While the natural phenomena previously referred to will indicate the presence of water near the surface, deeper sources of supply require very close scientific observation and investigation before advice can be given as to the probabilities of success in the search.

A few persons may be able, without scientific knowledge, to indicate the presence of underground water, from the physical features and general conformation of the country, but as such conformation does not always give evidence of the geological changes which have occurred at great depths, these indications cannot always be relied upon. In the selection of a site for well or bore the intelligent observer will be helped by noting carefully the direction and the angle at which outcrops of water-bearing rocks occur, such as porous sandstones, &c. These outcrops will often be found at the foot of a range of hills or ridges running parallel to the same, and dipping, sometimes towards the rise, sometimes away from it at various angles. Should the rock be dipping away from the ridge or hill, especially if underlaid with a bed of clay, water will, in all probability, be found at a depth in proportion to its distance from the

outcrop and to the depth of the strata, as shown on the diagram (Fig. 14); but should the outcrop dip in the opposite direction or under the hill, it would be useless to sink, as disappointment would result.

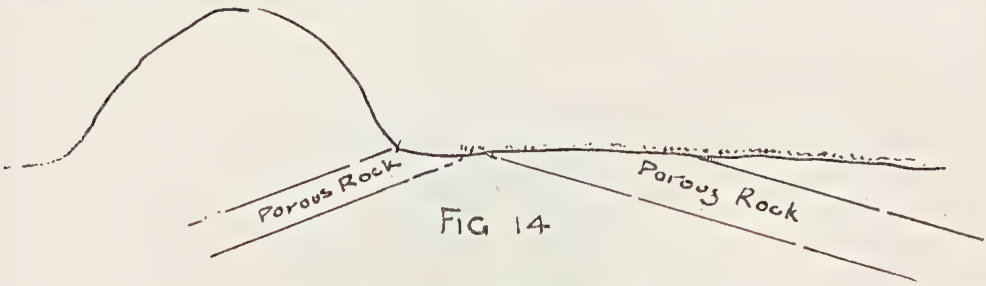


FIG 14

It may be often noticed on the Downs country in Queensland, that a number of windmills have been erected and bores drilled in comparatively straight lines, extending for long distances. This is because it has been proved that underground water generally flows in fairly straight lines, and in such districts it is quite a safe rule to be guided by the position of other bores.

In nearly every part of the country, outcrops may be found of very hard rocks of an impervious character, of different geological classification, indicating dykes or volcanic upheavals, resting at all angles with the horizon. Where these outcrops can be traced, water will, in all probability, be found by sinking on that side of the outcrop which is nearest to the hill or higher levels from which the water flows, but sufficiently far from the outcrop to clear the dyke, which may be thousands of feet in depth, but not more than 10 to 100 ft. in thickness.

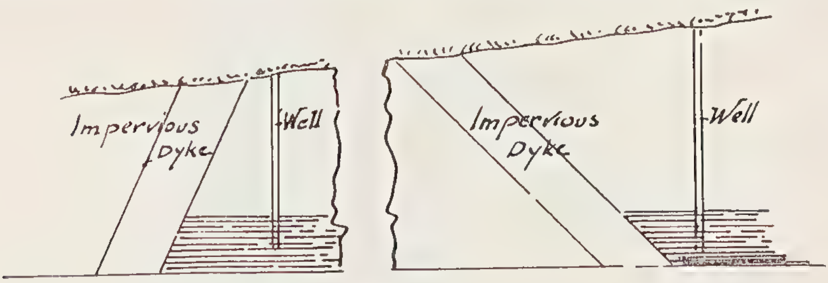


FIG 15

In country imperfectly explored, of which no detailed geological maps exist, the surface should be carefully inspected for outcrops, and all natural sections which may be revealed at the sides of valleys and precipices should be examined to ascertain the nature and dip of the strata. In broken or undulating country it is not difficult even for an amateur to find these outcrops, but in level country, such as our "rolling downs" and vast plains, only a thoroughly competent and experienced geologist will be able to detect the same.

Natural phenomena—physical and geological surface indications—having been referred to, it is now necessary to consider other means of discovering underground water supplies at various distances from the surface, and will first receive attention. The Public Estates Improvement Branch of the Lands Department possesses two of these useful

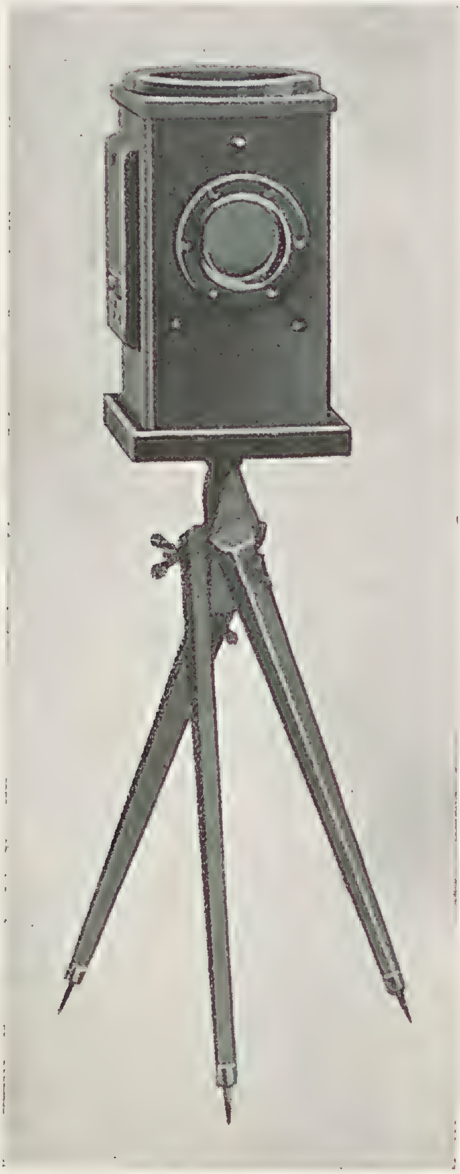


PLATE 53.—THE AUTOMATIC WATER FINDER.

instruments, and others of the same kind are in use by private individuals in different parts of the State. Although these instruments have been in use for several years, it is somewhat remarkable that no reference is ever made to their use by recent writers or controversialists on the " Divining-rod." The writer is of opinion that the action of this

instrument to a large extent explains the action of the much-debated divining-rod, and upsets all the nonsensical theories of supernaturalism and spiritualism which we sometimes see advocated in the Press of to-day. "The Month: Sciences and Arts" section of "Chambers's Journal," of 1st April, 1908, thus refers to the "Automatic Water-finder":—

"One of the most remarkable applications of automatic mechanics is the automatic water-finder, a scientific development of the divining-rod. The deficiencies of the lastnamed have long been known, despite the successes that have been achieved therewith; but the new appliance is stated, as the results of several tests in the hands of well-known engineers, to be infallible in its action. The device is extremely simple, comprising a small magnetic needle, similar to that of the mariner's compass, mounted in a small box, which is carried on a tripod.

"When it is put in operation, the presence of subterranean sources of water is immediately betrayed by the violent agitation of the needle, the oscillation being, in some cases, as much as 150 deg. Unlike the old-fashioned and primitive divining-rod, the appliance is not affected by other infiuences than those of water, which consequently renders it absolutely reliable in its action. Moreover, in prospecting for water, a fair estimate as to whether the sources available are sufficiently adequate to warrant boring may be gathered from the degree of the needle's agitation, while should no water be existent the needle remains absolutely stationary.

"Being simple of construction, there is little likelihood of the apparatus becoming deranged, while at the same time it is of sufficiently strong design to withstand the rigours of transport over rough country. The instrument has been subjected to several experiments by water engineers and divining-rod experts, and has met with conspicuous success."

The following description is by the makers:—

"The instrument indicates the presence of subterranean flowing springs at depths up to 1,000 ft.

"The principle on which it works is the measuring of the strength of the electrical currents which are constantly flowing between earth and atmosphere, and which are always strongest in the vicinity of subterranean water-courses, the flowing waters of which are charged with electricity to a certain degree. Should a subterranean spring be present under where the instrument has been fixed, the needle commences to move, note being carefully taken of the number of degrees on the scale, and the position of the instrument changed from time to time; the spot where the greatest movement of the needle has been obtained is that where the well boring should be made.

"If the needle remains stationary, it may be taken for granted that a subterranean spring does not exist under the spot where the instrument is fixed.

* * * * * * *

"Observations should always be taken between 8 and 12 in the morning and 2 and 5 in the afternoon, these being the hours of greatest activity of the vertical air currents. A fine, calm, clear day should be selected, as the instrument does not work so well when earth and atmosphere are saturated with moisture. It does not work under trees or in the immediate vicinity of iron structures.

"It only indicates water-courses flowing underground in a natural state, and not water pipes or sources that have sprung up to daylight.

"The instrument consists of two chambers; the upper one, which has a glass window, is opened at the side by means of a hinged door to permit of the needle being placed in position; the lower one is intact, and contains a cylinder 6 in. long by 4¾ in. diameter, with ½ in. hollow core in the centre. The whole is wrapped in paraffin wax. This cylinder must contain an electro-magnetic coil or an induction coil, which deflects the needle in its vicinity. It is made in two sizes—one indicating springs at a depth up to 1,000 ft., the other indicating up to 500 ft., and there is a local agent in Brisbane for the sale of same.

"Probably the best use is being found for the instrument in confirming the tests of rod-divining, the hand tests obviating the frequent setting up of the instrument to prove whether or not the land is even water-bearing."

The records of the Public Estate Improvement Branch of the Queensland Lands Department show that the instrument has been unusually successful in locating sites for bores and wells. Very few failures have occurred since its working has been thoroughly understood; but it is to be regretted that it—unlike the divining-rod—will not work under trees or in the immediate vicinity of iron structures. As there can be no legerdemain about this, it is proved that electrical or magnetic currents in some form do exist, and are set up by the action of running water in the ground, a subject on which we shall have more to say presently. It is understood that this instrument, though belonging to the Government, is not for private use; but, as already stated, there are several well-borers in Queensland who use it regularly, and are prepared by its use to guarantee success. At the time of writing, the greatest depth to which a bore has been sunk successfully with the aid of the Department's instrument is 550 ft. Another means largely made use of all over the world for discovering water is

THE DIVINING-ROD.

In the Middle Ages, when superstition was rife, it was relied upon for the detection of criminals, and other nonsensical purposes. It had various forms as seen in the illustration (Fig. 16). It is said to have been transmitted from the Mongols, through Scythia and the Tartars, to the Persians and Jews. Whatever its origin, it was known and practised by the Ancients, and on account of the mystery associated with it, was regarded with superstition and dread. Notwithstanding the discoveries of science, we do not appear to be much farther advanced in the solution of the mystery than the Ancients. Those who believe

in it and practise it can give no definite scientific explanation of its action, while the multitude still regard the practise of it as so much fraud, trickery, and quackery.

In these practical times the use of the rod is most frequently requisitioned for the discovery of underground springs, and it appeals

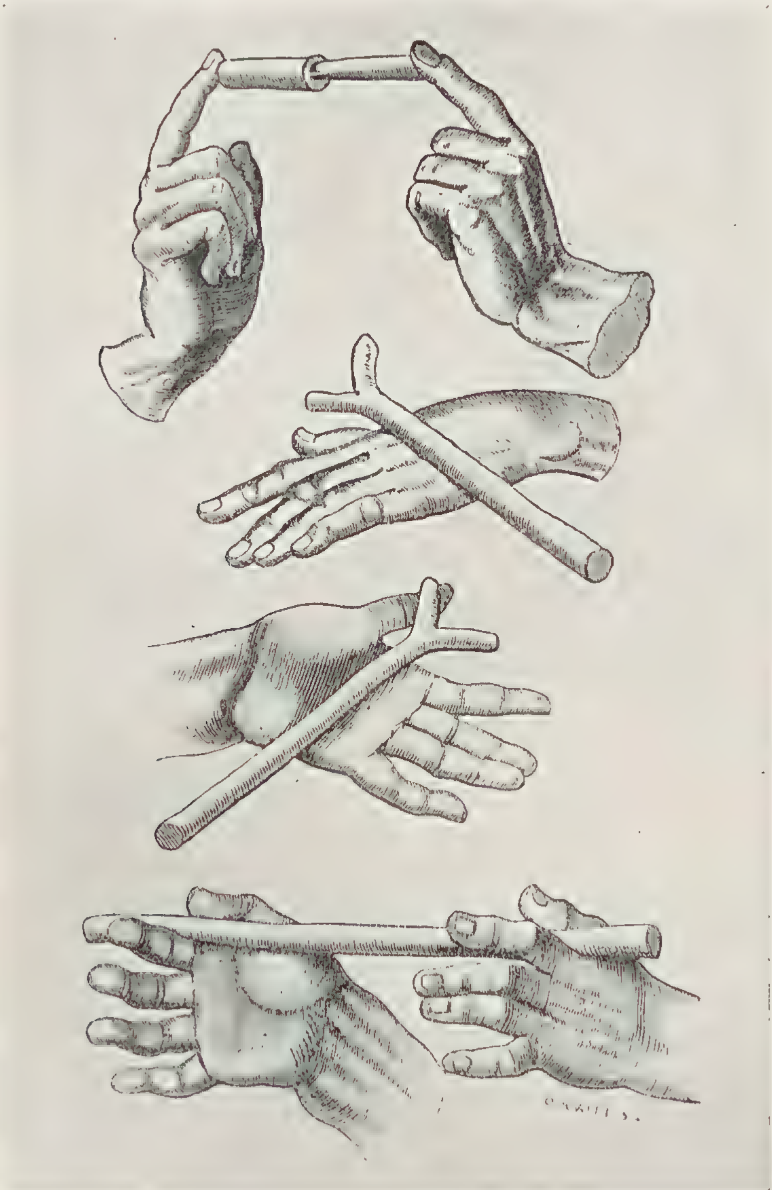


PLATE 54.—ANCIENT EXAMPLES OF WATER DIVINING-RODS.

most strongly to us as a kind of scientific instrument depending on some yet unexplained force of Nature. It is a fact that the magnetic needle moves towards iron always, but only towards copper when carrying a galvanic current. For want of a better explanation, this is called a "property" of iron, and it is just as feasible or possible that a rod

of a certain form, held in a proper position, may, in the hands of a specially sensitive person, move under the "induction" of running water. That great success has attended its use is absolutely without question, and it is because there is so much scepticism on the subject, because the successes have been so numerous, the interest taken increasing every day in scientific circles, and because it is a subject of vast importance to the farmer in search of a permanent water supply, that we desire to deal with it prominently in this section. Many persons refuse to recognise it as a scientific fact, because they cannot understand it, and because no explanation of its action has yet been made which to them is satisfactory, as if there were not scores of other things in Nature which cannot be explained or understood, yet which must be accepted as facts. Who would have thought twenty years ago that the ether waves of the atmosphere would be used for conveying thought from one point to another; and sooner or later science will learn how to utilise for the service of man these mysterious earth currents, by measuring their intensity, and thus estimating to a point of accuracy the depth and volume of the aquatic flow from which they originate. The writer knows of a case where a site for a well was selected by the use of the "rod," but an eminent engineer, well versed in the intricacies of hydrogeology, declared that no water could be found in such formation, and it was useless to sink. Yet an excellent supply was obtained on that very spot, and continues to flow to this day. Another case is known to him where a geologist of repute advised that conditions were totally unfavourable for water, and the bore, the site for which had been selected by the use of the divining-rod, should be abandoned. Yet an additional depth of less than 15 ft. rewarded the searchers with an abundant supply of excellent water. Such instances could be multiplied many times, and volumes could be written in proof of the fact that the divining-rod has been, and is, a most useful instrument in locating underground streams.

One of the most recent denunciators of the "rod" is Mr. Myron L. Fuller, of the United States Geological Survey, who expresses himself very strongly in these words:—"Numerous mechanical devices have been proposed for detecting the presence of underground water, ranging in complexity from the simple forked branch of witch hazel, peach, or other wood, to more or less elaborate mechanical or electrical contrivances. Many of the operators of these devices, especially those who use the home-cut forked branch, are entirely honest in the belief that the working of the rod is influenced by agencies—usually regarded as electric currents following underground streams of water—that are entirely independent of their own bodies, and many uneducated people have implicit faith in their ability to locate underground water in this way . . . but its operators are successful only in regions in which ground water occurs in a definite sheet in porous material, or in more or less clayey deposits. . . . Ground water occurs under certain definite conditions, and just as surface streams may be expected wherever there is a valley, so ground water occurs where certain rocks and conditions exist. No appliance, either mechanical or electrical, has yet been devised that will detect water in places where plain common sense

will not show its presence. The only advantage of employing a "water witch," as the operator of the divining-rod is sometimes called, is that crudely skilled services are thus occasionally obtained, since the men so employed, if endowed with any natural shrewdness, become, through their experience in locating wells, better observers of the occurrence and movements of ground water than the average person."

That is the opinion of one scientific man who evidently has taken very little trouble to fortify his opinion by the experiences of others. Some years ago, Sir Oliver Lodge undertook the investigation of the subject, but, through some cause not yet explained, those investigations still remain incomplete. Another eminent scientist, Professor Barrett, F.R.S., of Dublin, some years ago made very exhaustive researches, in the course of which he made experiments with several hundreds of persons who used the "rod," and he published the results in a very elaborate report, in which he gives numerous testimonies of men of unimpeachable integrity and high scientific attainments who witnessed the experiments, and were satisfied that some hitherto unexplained influence enabled the operators in most cases to succeed in their search, when there was absolutely nothing to guide them but the faculty they possessed, which faculty is still an unknown quantity around which has raged the fierce battle of the *pros* and *cons.*

Mr. Fuller's statement given above, "that no appliances . . will detect water in places where plain common sense will not show its presence," is knocked over by the fact that streams may be found by the divining-rod when the operator is blindfolded and absolutely ignorant of his whereabouts or of the nature of the country he is testing. Opponents are apt to ridicule the statement that a person is able to find water underground by the use of these agencies, but if a thirsty camel in desert country starts off at once and reaches within a mile or so the means of quenching his thirst, the occurrence is looked upon as being quite natural.

Our own experience is absolutely confirmative of all that is claimed, for in no single instance where wells or bores have been sunk on sites indicated by us with the use of the divining-rod, has failure resulted, though the sites have been hundreds of miles apart and in widely different country, with which we were unacquainted. The writer has submitted himself to all kinds of tests, and blindfolded, under the most severe conditions, has invariably marked the same spots, so that whatever may be the influence—"electric," "magnetic," "unconscious muscular action," or whatever it may be called—he is firmly convinced of its enormous value when used for this purpose.

The editor of this Journal, writing in April, 1903, says:—"We ourselves have seen medicinal springs discovered in Switzerland, at Rossinieres, near the lake of Geneva, by the help of a willow fork. We have since seen two springs discovered at Oxley Creek—one a mineral spring in Mr. Donaldson's paddock; the other in our own orangery only 100 yards from the former, but yielding perfectly sweet water. Prior to these discoveries people had to travel over 1½ miles for water

for domestic purposes. In 1901 the municipal authorities of Toowoomba decided that a fresh water supply was urgently needed for the town, and schemes were proposed the cost of which was estimated at from £110,000 to £250,000. Mr. Palethorpe, a resident, offered to find a supply which would be ample for all purposes. The offer was accepted, and a shaft was sunk at the spot indicated. At 60 ft. a supply of beautifully clear, pure water was struck within 16 yards of a well, the total depth of which was 90 ft., and which had gone dry. The well ultimately yielded 336,000 gallons per day. . . . Facts are stubborn things, and these are facts which cannot be disputed, as they can be verified without leaving Toowoomba, and are vouched for by well-known citizens, squatters, farmers, and others in various parts of the South of Queensland."

The question which scientific men are asking to-day is—" What is the subtle influence at work? What moves the rod, or other agency used by the operator?" Men of science, associated with the most learned institutions in the world, are not ashamed to consider this a subject worthy of their attention. We have dealt somewhat fully with it because of its importance, and because of its connection with our subject of " Springs and Subterranean Supplies," and will close with a recent extract from the " Westminster Gazette" on

" SCIENCE AND THE DIVINING-ROD.

" That much-debated instrument, the divining-rod, seems to stand a considerable chance of having its claim endorsed by scientific opinion. At all events, it is now occupying a considerable share of the attention of various important scientific bodies abroad. The congress of experimental psychology proposes to organise a competition for diviners in Paris, while the German Society of Agriculture, in Berlin, is discussing in all seriousness the practical utility of the divining-rod for discovering supplies of water. Certainly in Germany scientific opinion seems to be fairly strong in support of the long-despised claims of the water-finders, for such famous geologists as Professors Hein, of Zurich, Hoernes, of Graz, and Haas, of Kiel, have declared in favour of it; while the Department of State Railways in Germany continually makes use of water-finders with divining-rods in its railway surveys.

" At the meeting of the Agricultural Society in Berlin, Dr. Behme, of Hamburg, in a scientific exposition of the subject, stated that he had made 600 experiments with twenty different diviners, and almost always had obtained results, though in a few cases flagrant mistakes had occurred. His conclusion was that it could not be questioned that certain individuals reacted in a particular way when they encountered a particulr configuration of the earth; nor is this unexplained phenomenon more mysterious than the transmission of thought. More precise explanations were attempted by Dr. Aigner, of Munich, and Professor Rasson, of Leipzig. Professor Rasson put forward the hypothesis that certain hitherto unknown rays emanating from the ground produced various muscular movements in the subject which resulted in the dipping of the rod."

The writer does not agree with Professor Barrett's conclusions given below, as to the influences producing the results which he vouches for:—

"1. That those who really possess this curious faculty are rare, and many pretenders exist.

"2. The involuntary motion of the forked twig which occurs with certain persons, is due to a muscular spasm, that may be excited in different ways.

"3. The explanation of the success of good dowsers, after prolonged and crucial tests, is, like that of any other human faculty or instinct, a matter for further physiological and psychological research, though provisionally we may entertain the working hypothesis suggested—viz., unconscious clairvoyance."

Whatever may be the mysterious power influencing the operator, the fact remains, firmly established beyond question, that these agencies can be successfully and usefully employed for the benefit of man, and we firmly believe that though this is a branch of science not understood at the present time, the time will come when its mysteries will be fully explained.

Wells and bores will be next dealt with.

[TO BE CONTINUED.]

HOW TO KILL JOHNSON GRASS.

Of late we have not heard very much of the pest known as Johnson grass, but in 1903 it, together with the worse pest, nut grass, was much in evidence on some Bundaberg farms. On one farm we visited, that of the Messrs. Redmond, Johnson grass was taking almost entire possession of a lucerne field. Mr. Redmond did not think it endangered the lucerne, saying that it was easy to get rid of it by mowing it down before it seeded, after which the roots gradually rotted out. We certainly had our doubts, as the grass is such a persistent rooter. However, from the following article which appeared in the April (1913) issue of the "Agricultural Gazette of New South Wales," it would appear that Mr. Redmond was not wrong in his method for its destruction.

The article in question is by Mr. H. A. Halbert, and appeared in the "San Antonio Express" (United States), and is as follows:—

"Don't dig Johnson grass. Raise it, kill it, and leave the roots as fertiliser.

"I admit that Johnson grass is twice as hard to kill, if not still harder, than most all other annuals, because Johnson grass has two methods of forming seed to perpetuate itself—one above ground, the grain, and the other below the ground, known as root stocks or rhizomas. They are called roots, but are not in the proper sense of the word a root. They have no power to gather food for themselves or for the parent stalk. The small, thread-like fibrous roots gather food from the soil

exclusively, and feed these root stocks just as they do the stalk above the ground. These root stocks, or underground seed, always start at the crown, just at, or a little below, the surface, where the roots and the tops of the grass join. They are supported by the parent plant for the first few inches of growth, until they dip into the earth and send out fibrous roots of their own. Then they are independent of the parent stalk. It is always the root stocks formed, say, in 1911, that send up the grass tops in 1912. The old root stocks that formed during the year 1910, and sent up tops in 1911, have no more power to send up tops in 1912 than will a cockle-burr root that grew in 1911 have vitality to grow another top in 1912.

"This being the case, we see that all that is necessary is to prevent these root stock seeds, or any of the grain seed, from forming, and the grass is destroyed. I have stated where they form—shallow, close to the surface—so the next step is, when do they form? Then can we intelligently fight the grass after knowing all its habits? These root stalks always form a certain stage of growth, and that is just as the grass bunches to bloom or to send out a seed head. Hence the two seeds above and below ground begin to form simultaneously. Knowing these facts, all the intelligent farmer has to do is to watch the growth of this grass, and shave it off with a weeding hoe or a sweep behind a horse at this critical stage, when no seed will form, and he will destroy it in a single year. It takes light but constant effort, and not the old back-breaking, ditch-digging process with a grubbing hoe, taught us by our blind leaders in authority."

PLANT PESTS—WATER HYACINTH, NUT GRASS, AND LANTANA.

WATER HYACINTH.

The water hyacinth, which has of late taken such a great hold of the upper reaches of the Brisbane, Logan, and other rivers in the South, is one of those pests which threaten to obstruct all navigation even for small boats. Should the plant spread to our northern rivers, and no steps be taken to prevent its spread, the calamity may reach the proportions which have caused the blocking of all water-borne traffic above tidal influence. It needs only a perusal of the accounts of what has happened in Florida (U.S.A.) to arouse the greatest fears for the navigation of the northern rivers of New South Wales and the southern rivers of Queensland. Notwithstanding the Bills presented to Congress embodying suggestions for dealing with the evil, the pest has distinctly triumphed. The plant flourishes in stagnant water and swampy places, of which fact there is ample evidence in Queensland.

The plant seems to have first appeared in the Sydney Botanical Gardens, and Mr. Maiden reckoned he had destroyed it in 1896, but with the warm weather it reappeared, and he then (1897) issued a warning that it would in all probability become a pest in the upper waters of the Macleay River northwards. To-day this has actually come

to pass, and although a war of extermination was carried out against it in the Ipswich district a year or two ago, the plant is now growing more vigorously than ever in the Upper Brisbane. It will not grow in tidal waters. If it would thrive in these, then the whole of the Brisbane River would be rendered unnavigable, for we have seen the river at Brisbane so densely covered with the plant that it was possible to walk on it almost from North to South Brisbane, the plants having floated down with the tide from the Upper Brisbane and Bremer Rivers. There appears to be no remedy for the pest, which threatens all the upper waters of our southern rivers. Water-borne pests are always more difficult to cope with than land pests, more difficult even than the prickly pear.

So long ago as the year 1900, when the hyacinth only existed in ponds and waterholes, and in a water reserve at Graceville, close to the Indooroopilly Bridge, Mr. Leslie G. Corrie, in a paper on "Some Pests," before the Agricultural Conference at Warwick, drew attention to the blocking up of rivers in Florida (U.S.A.), and to the consequent enormous losses sustained by timber merchants who suffered to the extent of £6,000 per annum owing to the impossibility of rafting logs containing an aggregate of 55,000,000 ft. of timber down the Oclawaha and St. John's Rivers. And while the plant at that time was only confined to waterholes in Southern Queensland, he warned the Government and the settlers on the upper rivers that a most acute problem would inevitably be presented to the State unless prompt measures were taken to stamp out the pest. These prompt measures were not taken, the warning was unheeded, with the result that to-day we are confronted with the possibility—the probability—that all water traffic will ere long cease between Brisbane and Ipswich.

NUT GRASS.

We receive many letters during the year from farmers and gardeners, particularly amateurs, asking for information concerning the destruction of nut grass. The only reply is: "We cannot tell." Nut grass, so far, appears to be ineradicable. It is, as Mr. Corrie, in his paper on "Pests," quotes, "as water spilt on the ground, which cannot be gathered up again." Further, he said:—

"Whilst a man may, by ceaseless activity, hold it in check, or, at great cost, actually get rid of it from a small flower border or town lot, these results do not come within any practicable or commercial reach when applied to larger areas.

"Nut grass, so called, as Von Müeller would have written, 'with double inaptness,' is really a sedge and bears no nuts.

"It is so distinct in appearance that, with ordinary knowledge, its first appearance upon land in cultivation should be a signal for its immediate extirpation.

"Under certain conditions its presence may be easily overlooked unless careful watch is kept, for when associated with other grasses, especially those which it more or less above ground closely resembles, it is not so easy to recognise, and besides, under such conditions of mixed

growth, it is generally weakly and loses some of its leading characteristics.

"A special mode of dissemination of this pest is by river or creek waters, particularly in flood time, so that the introduction of the plant at the head of any watercourse means serious danger to all land fronting on the waterway lower down.

"In this manner, for instance, a general distribution has come over all the Brisbane River frontages; and when the 1893 flood reached higher levels than any previously recorded, nut grass was put upon land up till then free from it.

"The risk of introducing nut grass along with trees and plants should make every buyer or introducer consider well before running it. This risk is lessened if the plants come well established in pots, for under such conditions, if the weed is not visible, in all probability there will be a smaller risk run. With plants recently lifted from the open ground there is more risk, and over these, both before and after planting, extra investigations should be instituted; and if on any occasion this pest be discovered, then by all means give it, and any plant that accompanies it, along with the enveloping earth and packing material, to the flames. And as regards the source of supply, follow the song, and "play no longer in that yard."

"In view of the gravity of the position it is a usual precaution with careful men to wash thoroughly the roots of their imported trees, &c., whether received in pots or not, and to burn all soil and packing material. This not only disposes of the nut grass risk, but of many other possible pests.

"In this connection, it is well to remember that in cold weather, nut grass has slow and feeble growth, and is consequently less conspicuous; so much so, indeed, that it is no uncommon thing for the uninitiated to imagine, when a severe winter comes, that they have got rid of it.

"A fertile source of introduction, and one every building owner who attaches any value to plant cultivation should pay vigilant attention to, is by medium of river or creek sand brought upon the site by the bricklayer or plasterer.

"In Brisbane and the suburbs it is quite the exception to see any heap of sand or fine gravel that does not contain this pest, and as a consequence, generally, the erection of a new building means the advent of nut grass into the property as a corollary. Now, with the simplest knowledge of the plant and prompt attention, should it be brought upon the property in this way, there is nothing to prevent its destruction.

"Another avenue of danger is the using of implements that have been worked in nut-grass-infected land, for, like the balance in the fairy story that came home with a piece of gold adhering, such things as harrows and cultivators, &c., have a wonderful knack of attaching to themselves fragments of this most vile weed. The writer knows one orchardist with clean land, who, though he does not refuse to lend his plough, &c., on occasions to his neighbour, who has dirty soil, makes it a stipulation that after use the implements shall be left on a piece of

hard vacant land outside his property, so that he can give them a minute examination before bringing them home again.

" There is no need for the writer to dilate on the cursedness of this weed, which has no value for fodder. Few, even amongst those who may be, on small areas, more or less successfully holding it in check, ever pause to consider what an annual tax, sometimes amounting to a respectable rent, it entails upon the capital value of the land.

" Nothing but total eradication is of any value. The theory that constantly cutting off nut grass below the level of the ground will kill it is perfectly fallacious.

" Naturally, if every top is kept cut off, the plant cannot seed, and reliable authorities state that through the seed the greatest propagation of the plant is effected. This may be so, but the writer's personal experience has not gone to demonstrate, in a single instance, that the pest has been propagated otherwise than from the root. Any introduction of the pest to new land has always been by plants or portions of the root, and any extension of the same when established has been from the same cause. In instances where it has made its appearance, say, in a new bed or part of a property, and at first attributed to seed, it has been possible always, upon careful inquiry, to trace the trouble to the other causes. Some interesting information is in hand in this connection, but is too lengthy for inclusion herein.

" One method for disposing of nut grass can be given, of possible value to the owner of a small garden. This has been proved by the writer a success in eradicating nut grass from garden walks where it was not desired to break the same up:—

" Make borings into the clumps of the pest with a piece of gaspipe—go well down; and then fill the openings with salt, and water same. This, if thoroughly done, will kill all the roots. It is, of course, not applicable to beds where other plants are expected to be grown, and is too costly for any general application. It is possible something cheaper than salt—such as partly-spent soda refuse from a soapworks—would prove just as efficacious.

" The Acclimatisation Society has proved that a patch of nut grass can be killed without injury to the soil by placing a thick heap of strong, new manure on the same. This, through fermentation that goes on, will kill any plant life that may be under it. It is, however, a lengthy and expensive operation, and of no general application.

" What has been written should go to show the vital necessity that exists for restricting the existing nut-grass-infected areas by every possible expedient, and for preventing the introduction of this worst of all plant pests into uninfected portions of the State."

LANTANA.

Another, yet not so ineradicable a pest as the two former, is lantana, which has one thing at least in its favour, and that is that it adds greatly to the fertility of the soil by the continued dropping of leaves, old twigs, and branches, which decay on the surface of the soil, adding humus and fertility to the same, besides which, the root developments,

&c., perforate and aerate and improve the subsoil. While it may be conceded that as a soil improver of waste land it has some value, still it is of no value as a forage plant, nor has it any other economic value. Mr. Corrie says:—

" Especially on good soil, lantana on the coast makes wonderful growth. On the edges of scrubs, the leading shoots may be seen up amongst the branches of small trees. Upon meagre soil the growth is much poorer, so much so that to an observer, bearing in mind certain limitations, its mode of growth is a fair index as to the quality of the soil.

" Its spread is practically only by seed distribution, in which the birds are the great carrying agents.

" Its eradication is of no very vital moment to the horticulturist. Small plants can be chipped out, and those of larger growth pulled up with the roots, as is done with briers and gorse by bullocks.

" Its presence, even in large quantities, is no special disadvantage in the eyes of a man designing to use the soil for intense cultivation of any kind—it being more easily got rid of off the soil than the usual native scrub growth. Indeed, the writer has found it much less expensive in certain seasons to make lantana land clean than a similar area covered with couch grass.

" There is one great compensation to be remembered in favour of this plant—viz., that all the while it is growing on the soil it is steadily improving the same. Just as our native scrubs are adding more yearly to the fertility of the soil, so with the lantana. It is very noticeable with land, upon which some clumps of it have been for any length of time, how an improved growth comes to certain crops just at these spots when cultivation takes place.

" Also, lantana will plant itself and commence its work of soil improvement in exposed spots, and under less favourable conditions than would keep our ordinary scrub plants from establishing themselves. The soil improvement is effected by the continuous droppings of old leaves and twigs and branches, which decay on the surface of the soil, adding humus and fertility to the same, besides which the root developments, &c., perforate and aerate and improve the subsoil.

" That lantana is on the whole a valuable addition to the growth on our waste lands, it is not attempted to plead, but a very great deal can be urged in the direction of soil improvement in its extenuation. It is of no value as a forage plant.

" Leaving aside the more or less aesthetic and scientific regret that all sympathisers with the colonial botanist must feel when noting how this vigorous newcomer is in places wiping out the local flora, a considerable amount of anxiety must come to the owner of grazing areas or land suitable for the same at the incursions of this pest, for pest it undoubtedly is if allowed to get any hold in grass land.

" Though more or less easily eradicated, as already mentioned, when it becomes a question of ridding badly infected soil from it, which soil has only a value for grazing purposes, then it becomes very much

a question, under existing conditions, whether the land occupier will not prefer to leave the land to the lantana and go further afield from its influence.

" The writer knows at the present time of considerable areas of rich coast lands, more or less in the hands of various financial institutions, and used for dairying purposes, in connection with which, if it becomes obligatory upon the lessees to clear the lantana off, they would at once throw up their leases, as the cost of this work would more than swamp their livings. Meanwhile the land-owners or mortgagors are disinclnied to spend the necessary amount, and each year the lantana clumps are widening and increasing in numbers and the grass areas lessening.

" A difficulty held up by men who see the gradual return of the old-time cleared land to a state of lantana scrub is the uselessness of their trying to keep individual farms clean, when their neighbours all round will make no effort, as a plentiful crop of seed is certain, under such conditions, to be available from the adjacent properties to resow any cleaned land.

" It is owing to this prolific growth from seed that the lantana is so objectionable and difficult to control. While it is admitted that it improves land, yet through its mutiplication and ready growth under conditions that would not encourage the native scrub plants, it is found coming up in all sorts of places where it is not wanted; and as for any improvement it may work in time to the soil, the commercial agriculturist prefers to arrange his soil enrichment in his own way.

" It is not easy to know what can be done now with lantana. To eradicate it entirely is out of the question, and in any efforts to hold it in check—for which purpose the divisional boards have authority—little effective good will come unless they all act in concert. A very large sum of money is involved by any campaign against a weed so distributed as this one; and though any land-owner can be made to pay the cost of dealing with it on his own property, it is manifestly bad business to put him to expense unless all others are similarly treated, and the local authorities' own lands and roads and the Crown lands of the colony are also, at the same time, cleaned of the pest.

" In the North, where lantana has not yet been introduced, it could be, if not kept out, at any rate dealt with promptly upon its first appearance if the necessary knowledge was placed in the way of the people, and thus a great outlay in the future would be avoided."

AN ELECTRIC RUBBER TAPPER.

A novel electrical tapper for rubber trees is the work of a German in Peru. Hollow iron channels, divided into sections, are fitted on the tree trunk, the sections containing pricking devices that can be worked at varying times by current from the central station. A receptacle in each section catches the latex, coagulating it with acid. The attachment may be left unvisited two or three months, and in the time 200 or 300 lumps of rubber may be accumulated from a large tree.

Pastoral.

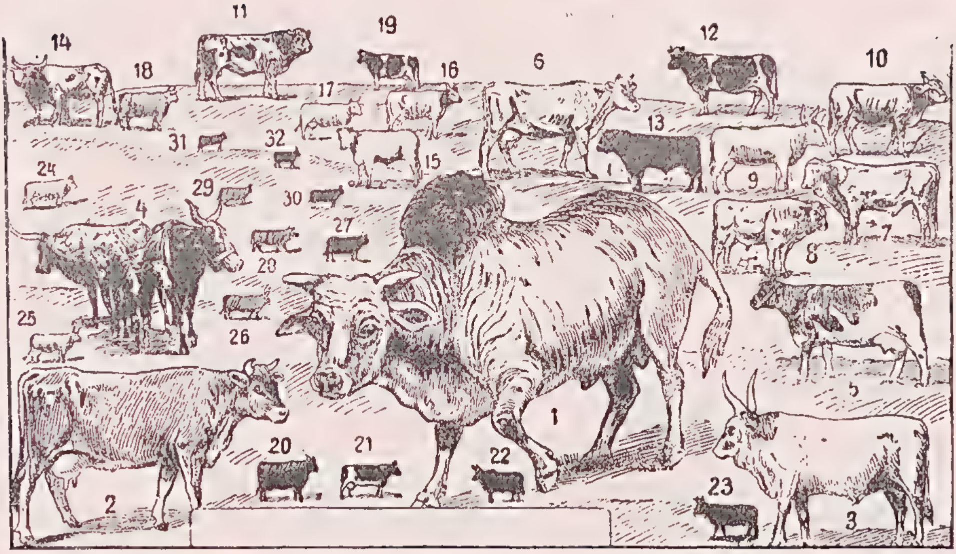
CATTLE-RAISING THROUGHOUT THE WORLD.

The accompanying illustration, which, together with the context, we take from "Die Ernahrung der Pflanze," an illustrated fortnightly journal published in Berlin, shows the comparative extent of cattle-raising in the several countries named.

India stands first in numbers of cattle, seeing that it possesses double the number credited to the United States of America, more than three times those of Russia, and surpasses by four times those of the Argentine, five times those of Germany, and seven times those of Austria-Hungary. Nevertheless, such statistics, however interesting they may appear, are of only conditional value, for cattle and cattle are, irrespective of quality also in quantity far different to those qualities as relating to pigs and pigs; and beyond that, the bare figures, without further explanation, do not suffice to account for the wealth of a country as regards cattle, even if it were possible to form a correct estimate of quality and quantity as may be done in the case of many European countries.

The requirements also in respect of the population must also be decided. If, for this purpose, we take a few European countries, we shall arrive at surprising results as to the percentage per head of the population. Thus, for Denmark, as the country richest in cattle, we get 0·901 per cent., for Russia 0·401 per cent., for Holland 0·368 per cent., for Austria-Hungary 0:366 per cent., for Germany 0·317 per cent., and for England and Ireland only 0·269 per cent. The quality as well as the quantity of cattle in Russia, and in parts of Austria-Hungary, is much poorer than in the other selected countries, so that comparative numbers for these two countries are unfavourable to them.

The unfavourable comparison of England is apparently counterbalanced as far as the feeding of the people is concerned by imports. But this position is practically only a delusion, for the compulsory importation, in order to prevent starvation of the population, constitutes at its best always a "dazzling poverty," seeing that England, under present conditions, has reached, in regard to home-production, the end of its tether, which, in view of the brilliant upward movement which characterises our present meat production, cannot, fortunately, be said of Germany.



CATTLE PRODUCTION OF THE WORLD.

1. British India ..	121,611,599	17. Sweden	2,747,526
2. United States ..	57,959,000	18. Roumania	2,588,526
3. Russia	37,343,075	19. Denmark	2,253,982
4. Argentine	29,116,625	20. Bulgaria	2,172,405
5. Germany	20,630,544	21. Holland	2,026,943
6. France	14,532,030	22. New Zealand	2,020,171
7. Austria	9,159,901	23. Cape of Good Hope ..	1,953,126
8. Uruguay	8,192,602	24. Belgium	1,856,833
9. Hungary	7,318,281	25. Victoria	1,547,569
10. Great Britain ..	7,114,264	26. Finland	1,522,028
11. Canada	7,086,600	27. Turkey in Europe ..	1,471,801
12. Italy	6,198,861	28. Switzerland	1,443,371
13. Mexico	5,142,457	29. Japan	1,384,183
14. Queensland ..	5,073,201	30. Bosnia and Hertzegovina	1,309,922
15. Ireland	4,711,720	31. Chili	1,220,203
16. New South Wales	3,140,307	32. Algeria	1,127,577

PLAN OF WOOLSHED FOR SMALL HOLDING.

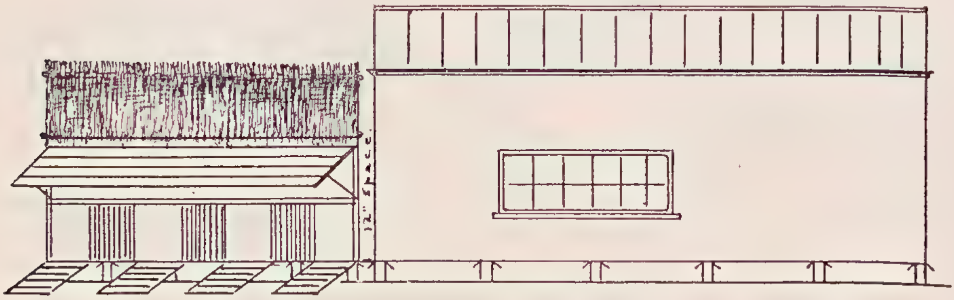
Several letters have reached me recently asking, among other things, for a plan of a woolshed for small holdings.

Below I give the design of a shed for four machines, which I saw in Western Queensland last year, and which I found to be very handy and comfortable.

It will be noticed that the pens and the shearing-board are roofed with boughs instead of the orthodox galvanised iron. I believe that for the Western districts a bough shed is quite good enough, provided, as is shown in the sketch, a good weather-proof woolroom be provided. It is easily constructed and easily renovated each year, and is very much cheaper in cost. I know of one which has been in use for over twenty years, and is still being used.

The only objection to the use of a bough roof is, that five mniutes after rain begins to fall shearing must cease, and the woolly sheep turned out; and, in my opinion, a very good thing too—for the sheep.

All the big smashes I have known in Australia have occurred to newly-shorn sheep turned out into the weather naked and hungry. It is certain, too, that the warmer months are the most dangerous in that respect. Surely lost time is only a small consideration as against the well-being of the animals. I know of a shed in New South Wales where there is accommodation for several thousands of sheep; enough for four days continuous shearing, even if it rain all the time. Twice I saw the wet-weather sheds put to full use, and twice I saw a fairly large number



of shorn animals die of exposure afterwards. It is certain, too, that a big proportion of the remainder received a set-back from which they did not recover for months.

Years ago I came to the conclusion that it is a mistake to have more than one day's accommodation for sheep in any shed, and at any time of the year.

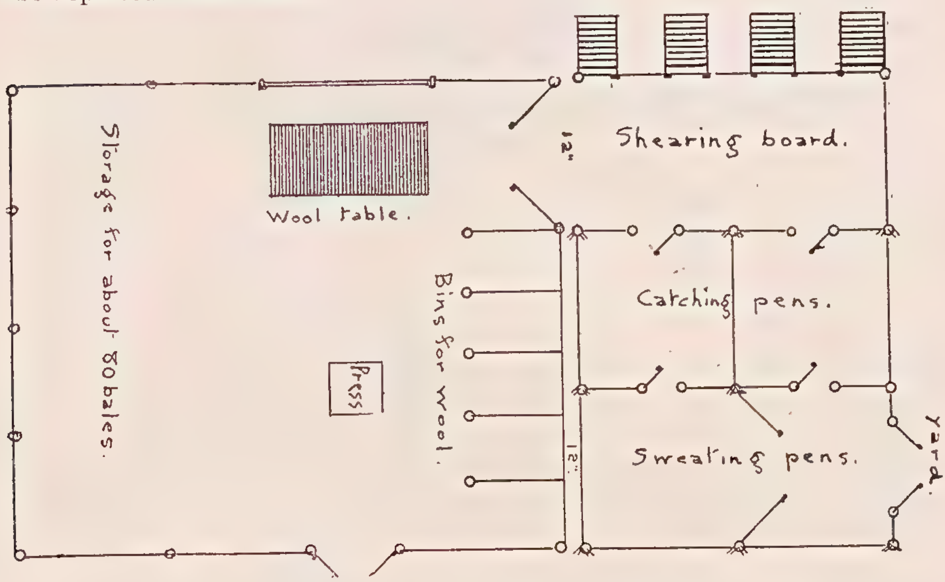
It will be noticed that I have made the wool-table somewhat larger than is usual. Four ft. by 12 ft. is quite small enough for clean and effective work of the kind I recommended in a former article in this Journal. I have also shown accommodation for the storage of about 80 bales of pressed wool. This is necessary.

The woolroom is 35 ft. long by 30 ft. wide; ground-plate to wall-plate 12 ft. in height; five woolbins are provided, and the press placed conveniently in front of them. The wool-table is placed in a direct line with the shearing-board.

The shearing-shed is, as said above, a bough shed. Twelve forked posts 3 ft. in the ground and 10 ft. out. These are placed 10 ft. apart and strong 6-in. cross-poles used to carry the boughs.

The shearing-board is floored with 6-in. hardwood boards on strong joists, and is 10 ft. wide. The catching-pens and sweating-pens must be battened with 2-in. by 2-in. battens. The posts to carry the head plank of the machines are 12-in. posts let 4 ft. into the ground, and placed 5 ft. apart. Six of these will be required. The sweating and catching pens are as shown in the accompanying illustration. The shearing-shed is built quite apart from the woolroom, access to which from the shearing-board is given through a door opening from the

woolroom. This door may be taken off its hinges during shearing, to be replaced afterwards.



I do not think any other explanation is necessary, as the design speaks for itself. A shed built like this should give every satisfaction. I have seen it in use, and can speak from practical experience that it is handy and easily kept clean.

CURE FOR CARBUNCLES.

Amongst the many ills the bush-dweller often suffers from may be mentioned Carbuncles. A man may be travelling, or camping in the Far West, possibly 100 or 500 miles from the nearest doctor, and suddenly develop that most painful and even dangerous affection—the carbuncle. Here is a remedy which we find advocated in "Farm and Home":—

"Dr. Reissman, after numerous experiments, advises that carbuncles should not be poulticed or cut unless there is a very serious and extensive involvement of the adjacent flesh. The best plan of treatment —while, of course, modified to suit individual cases—is this: If the inflammation has attained quite considerable proportions, with a good deal of hardness and no opening or outlet, a small incision should be made about ¼ in. in length, after deadening the sensation by means of ethyl chloride, and then a "cup" large enough to extend a little beyond the external margin of the swelling should be applied. This cup is left in place from ten to twenty minutes at each sitting. On removal of the cup, the surface is cleansed and a plain wet dressing applied. This treatment carried out for five or six days will in nearly all cases effect a painless cure, free from discomfort. A serviceable cup may be devised by simply heating the inside of a glass and applying it to the carbuncle.

Dairying.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

MILKING RECORDS OF COWS FOR MONTH OF APRIL, 1913.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Test.	Commercial Butter.	Remarks.
			Lb.	%	Lb.	
Madame Melba	Holstein	2 Jan., 1913	920	3·8	38·95	
Daisy ...	,, ...	4 Feb. ,,	1,097	2·7	34·70	
Glen ...	Shorthorn ..	5 Sept., 1912	576	5·1	33·10	
Miss Melba	Ayrshire	22 Jan., 1913	824	3·2	29·07	
Miss Jean ...	,, ...	5 Mar. ,,	716	3·6	28·60	
Bluebelle ...	Jersey	2 Aug., 1912	446	5·3	27·76	
Lady Margaret	Ayrshire	26 Mar., 1913	840	3·0	27·60	
Lavinia's Pride	,, ...	2 Feb. ,,	771	3·1	26·29	
Queen Kate	,, ...	17 Feb. ,,	651	3·4	24·49	
Rosalie ...	,, ...	15 Aug., 1912	390	5·2	23·82	
Bella ...	,, ...	4 Dec. ,,	508	4·2	23·80	
Pauline ...	Shorthorn... ...	7 Dec. ,,	497	4·2	23·37	
Lady Loch...	Ayrshire ...	10 July ,,	434	4·7	23·10	
Lark ...	,, ...	22 Jan., 1913	785	3·7	22·31	
Silver Nell ...	Shorthorn... ...	29 Oct., 1912	402	4·9	22·22	
Sweet Meadows	Jersey	3 Sept. ,,	312	6·0	21·99	
Miss Lark ...	Ayrshire	12 Dec., ,,	559	3·5	21·59	
Conscience ...	,, ...	16 Feb., 1913	582	3·2	20·50	

NOTES ON THE COMPOSITION OF SALT AND PRESERVATIVE.

By E. GRAHAM, Dairy Expert.

In accordance with an existing custom, the inspectors under the Dairy Produce Acts collected, for the purpose of analysis, a further series of samples taken from the various brands of salt and preservative used in connection with the manufacture of dairy produce.

The samples were duly submitted to the Agricultural Chemist (Mr. J. C. Brünnich), and his findings and comments are of sufficient importance to arrest the attention of manufacturers of butter and cheese.

A perusal of the results of the analyses given below reveals that "Lymm Salt" still maintains its superiority of quality over the other brands of salt offering on the market, and it is shown to be almost a chemically pure product.

The salt most inferior in quality was found, under analysis, to contain slightly over 2½ per cent. of impurities in addition to a high moisture content.

Butter and cheese factories are again advised to use only the purest of salt in the manufacture of dairy produce.

ANALYSES OF DAIRY SALTS.

Brand.	Free Moisture.	Combined Water.	Sodium Chloride (Salt).	Gypsum.	Magnesium Chloride.	Alumina.	Sodium Sulphate.	Insoluble.	Remarks.
	%	%	%	%	%	%	%	%	
Lymm	trace	·14	99·76	trace	trace	Nil	Nil	Nil	Average of eight samples.
No. 2 ...	·04	·61	97·06	1·28	·22	·27	·31	·21	
No. 3 ...	·28	·83	96·98	1·05	·19	·38	·19	·10	Average of three samples.
No. 4 ...	...	1·51	95·97	·56	·45	...	1·44	·07	

ANALYST'S COMMENT.

"The Lymm salt is practically a chemically pure salt, containing only faint traces of impurities with small amount of moisture. This salt is now generally used, and the other salts, which are met in only a very few instances, contain too high an amount of gypsum and magnesium chloride. One sample received from a factory is of particularly poor quality and should never be used."

ANALYSES OF PRESERVATIVES.

Number.	Borax.	Boric Acid.	Total Equivalent to Boric Acid.	Sodium Chloride (Salt).	Potassium Nitrate.	Remarks.
No. 1	36·97	62·66	101·93	...	Nil	Average of three samples.
No. 2	36·81	63·34	99·83	...	Nil	
No. 3	30·39	60·36	84·64	8·83	Nil	Average of two samples.
No. 4	7·97	75·46	85·10	4·60	9·66	
No. 5	9·51	91·41	102·80	Nil	Nil	
No. 6	15·62	84·35	103·65	·57	Nil	Average of two samples.

ANALYST'S COMMENTS.

"Preservatives No. 1 and No. 2 are of practically the same composition, as both contain about 100 per cent. of boric acid in the form of partly hydrated borax and boric acid.

"Sample No. 3 contains a large percentage of common salt, while sample No. 4 contained salt and saltpetre, the latter in a large percentage, although saltpetre is not allowed to be used under the Dairy Produce Acts."

The analyses of the various brands of preservative go to show that some of the brands of preservatives are not free from extraneous matter, and the salt and saltpetre discovered in their composition can only be regarded in the light of adulterants, as their presence does in no way assist in retarding deterioration in the quality of the butter when added to it.

Factories have been repeatedly warned against the indiscriminate use of preservatives without having first acquired a knowledge of its composition, and the analyses of the preservatives No. 4 and No. 5 provide a further illustration for the necessity of greater precaution to be exercised in this direction.

Poultry.

REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, APRIL, 1913.

The ninth egg-laying competition commenced on 1st April with 40 entries, made up as follows:—34 pens White Leghorns, 3 pens Brown Leghorns, 2 pens Black Orpingtons, and 1 pen Red Sussex fowls. The weather during the month has been very dry, but mild and favourable for egg production; the pullets, consequently, responded well, enabling us to report a very good start—the best we have had for some years; 2,719 eggs were laid during the month. Loloma Poultry Farm and A. F. Gamkin's birds both had a slight attack of warts; A. T. Coomber has two birds in moult; all the others are looking well. A. H. Padman wins the monthly prize with 137 eggs. The following are the individual records:—

Competitors.	Breed.	April.
A. H. Padman, Pirie street, Adelaide, S.A. ...	White Leghorns ...	137
Cowan Bros., Acton street, Burwood, N.S.W. ..	Do.	119
F. McCauley, Clifton	Do.	117
O.K. Poultry Yards, Toowoomba	Do.	110
E. A. Smith, Paddington, Brisbane	Do. (No. 2)	109
J. R. Wilson, Eudlo	Do.	107
T. Fanning, Ashgrove, Brisbane	Do. (No. 2)	100
Mrs. Sprengel, Coranbong, N.S.W.	Do.	100
Mrs. J. R. D. Munro, Sunnyside, Warwick ...	Do.	100
H. Tappenden, Barton street, Maryborough ...	Do.	100
T. D. England, Adelaide street, Brisbane ...	Do.	90
Yangarella Poultry Farm, Indooroopilly	Do.	89
J. McKay, College road, Gatton	Do.	86
J. Murchie, Childers	Brown Leghorns ...	86
E. A. Smith, Paddington, Brisbane	White Leghorns (No. 1)	81
J. F. Coates, Harveston, Rockhampton	Do.	77
J. Zahl, Boonah	Do.	75
Moritz Bros., Kalangadoo, S.A.	Do.	74
D. Grant, Boonah	Do.	73
Mrs. Bieber, Childers	Brown Leghorns ...	70
W. D. Bradburn, Bexley, N.S.W.	White Leghorns ...	65
J. Gosley, Childers	Do.	64
A. T. Coomber, Bundaberg	Do.	63
Loloma Poultry Farm, Bexley, N.S.W.	Do.	61
R. Jobling, Brookstown, Wallsend, N.S.W. ...	Do.	60
Doyle Bros., Chetwynd Grove, Merrylands, N.S.W.	Do.	58
C. Leach, Mooney street, Belmore, N.S.W. ...	Do.	51
J. Andersen, Boundary street, Mordialloc, Vic....	Sussex	50
A. C. Collis, Rookwood, N.S.W.	White Leghorns ...	49
A. F. Gamkin, Kogarah Bay, N.S.W.	Do.	47
R. Burns, Sladevale, *viâ* Warwick	Black Orpingtons (No. 2)	46
A. Schbrowski, Childers	Brown Leghorns ...	45
T. Stephens, Breakfast Creek, Blacktown, N.S.W.	White Leghorns ...	37
Range Poultry Farm, Toowoomba...	Do.	36
S. E. Sharpe, Childers	Do.	36
Mrs. Craig, Miriam Vale, N.C. Line	Do.	36
H. Hammill, Kogarah Bay, N.S.W.	Do.	33
R. Burns, Sladevale, *viâ* Warwick	Black Orpingtons (No. 1)	33
J. Archibald, Pelaw Main, West Maitland, N.S.W.	White Leghorns ...	28
T. Fanning, Ashgrove, Brisbane	Do. (No. 1)	21
Totals	...	2,719

State Farms.

THE MANGEL WURZEL AT KAIRI STATE FARM.

By D. MACPHERSON, Manager State Farm, Kairi.

A small area of this crop was planted last February, twelve months; on virgin scrub land, burned off three months previously. The seed was just chipped in amongst roots and logs. The result justifies me in saying that this valuable fodder crop is well adapted to the Tableland. The illustration gives some idea of the crop obtained; note the kerosene tin on the right. A further plot was sown in January of this year, and another in February; both give promise of good crops.

Plate 55.—Mangel Wurzel at Kairi State Farm.

The mangel is a valuable addition to the winter ration of any farm animal, and in Queensland requires no storing, the roots being at their best during winter and spring. They are a very easy crop to harvest, as the roots pull out very readily, and being of considerable size a load can be got very quickly. If fed in conjunction with a dry ration, mangolds have much the same effect on horses and dairy stock as young grass.

As a farm crop the mangold has the advantage of being most tolerant of extreme weather conditions. Unless on low-lying land, it is almost impossible for it to get too much rain, while it will live through a spell of dry weather that will starve out most green crops.

Another advantage the mangold crop has to the farmer is that it gives an opportunity to clean the land of weeds without fallowing it.

The critical time with mangolds is until the roots begin to swell; a bright sunny day will often scorch off a lot of young plants that have just come through. If this happens, the blanks should be resown as soon as possible. Should the blanks not be too numerous, it is better to wait till the mangolds are about 1 in. diameter, and then fill up the blanks from the thick places.

It is a mistake to try and move the plants too young; they should have a fair root, and the tops should be cut back hard. Twelve pounds of seed per acre, sown in rows 3 ft. apart, and thinned out to a plant every 18 in., give the best results.

In working with a small area, it is wise, if one wants early feed, to thin to 9 in., and then when half grown remove every second root for fodder.

The use of the scuffler between the rows is of great service, and too much of it can hardly be done. It assists in the weeding, and helps the plant to withstand dry weather.

MAIZE AT WARREN STATE FARM.

The manager, Mr. T. Jones, sends the following report on two varieties of maize harvested this season on the farm:—

During last December several plots of maize were planted at this farm for the purpose of determining their value on our soil. Two of these varieties have already been harvested, and the results have been as follows:—

Hildreth.—The Hildreth corn is a variety which has been developed during recent years in Kansas, where it has proved a promising variety for rich soils. The ears are large in circumference, and of fairly good length. The cobs are large but the grains are deep. The space between the rows is rather deep. The grains are of a deep yellow colour. The butts and tips are not well filled, and the cobs are not well covered with husks, consequently the grain was affected by wet weather and by weevil. The yield per acre was 29 bushels, and there was but little of the grain fit for seed owing to weevil in the field.

Yellow Dent.—There are so many "Yellow Dent" varieties on the market, and they all resemble each other so much, that it is difficult to say which variety this particular Yellow Dent is. The description of the one at Warren is as follows:—

A medium large, and medium late in maturing. Height of cobs on stalk irregular. The ears are slightly tapering, and the grain is of a medium yellow colour. The indentation is medium rough. The cobs are well covered with husk, and only a few of the cobs have been touched by weevils. The yield was 38 bushels per acre. I believe that by careful selection, this variety will prove a good class of maize for this locality.

Other varieties planted were: Small Horse Tooth, Hickory King, Boone County White, Sydney Red, Large Horse Tooth, and Early Leaming. These have not yet been harvested.

The Orchard.

DYNAMITE IN THE ORCHARD.

Mr. R. B. Howard, Chief Protector of Aborigines, whose operations in connection with the use of explosives on the land have been markedly successful at Indooroopilly, sends us the following extract from the *Melbourne Leader* of 10th May instant:—

"Some of the Beaconsfield land-owners have found the use of explosives a cheap and effective method of clearing the land in preparation for planting. At a demonstration given for the information of the writer, Mr. Geo. Knox exploded four plugs of dynamite underneath a 12-in. dry stump, with the result that the latter was blown clean out of the ground and thrown a distance of about 15 yards. Six plugs were placed under a much larger stump, and, although the explosion was not sufficient to remove it bodily, it was completely loosened, and might easily have been pushed over with a jack. Eight plugs, costing, with cap and fuse, about 9d., would have lifted it right out. Such a stump could not be hand grubbed for less than 2s. The process is a very simple one; a 2-in. auger with a long shank is used for making the hole, which is driven as far underneath the tree as possible; all the sticks of dynamite or gelignite save one are broken into pieces and pressed into the hole by means of a wooden rod; the last stick, fitted with cap and fuse, is then inserted and tamped in with a few inches of soil on the top. The fuse is timed to burn at the rate of 2 ft. per minute, so that a 3-ft. hole gives the operator one minute and a-half to get away. Very little soil is blown out of the hole, but the ground is left so completely pulverised that the wooden rod can be thrust in to a depth of 3 or 4 ft. below the bottom of the excavation, and for a considerable distance all round. There is no bank of earth to throw back, as there is after hand grubbing, and the hole is easily and quickly filled in. The saving in time is considerable, as a big stump can be blown out 'while you wait,' with very little more labour than a small one. To show the value of dynamite for subsoiling, Mr. Knox exploded a single plug in a 3-ft. auger hole, with the result that the soil was loosened up within a radius of 5 or 6 ft., and the rod was easily thrust in to a depth of 3 or 4 ft. This by no means indicated the limits of the effect of the explosion, the ground being doubtless shattered much further than could be probed with a blunt stick. It appeared as though a cartridge at every 10 or 12 ft. would break up the whole of the subsoil more effectively than any other method, and leave the ground in excellent trim for planting. Where subsoiling was not necessary a couple of cartridges exploded at every spot where a tree was to be planted would be a splendid preparation. In removing stumps judgment is required to put sufficient explosive into the hole without using enough to produce an unnecessary disturbance. It is not the sort of work to give a stupid person to do, but with due care there need be no accident. One of the settlers has an electrical apparatus for exploding a number of charges at one time without the use of fuse. This outfit costs £15, but where a lot of work is to be done it saves time, besides reducing the risks.

THE JAVA MANGOSTEEN.

(*GARCINIA MANGOSTANA.*)

By HOWARD NEWPORT, Instructor in Tropical Agriculture.

There has been some question as to whether the true Java Mangosteen existed in Queensland, owing principally to a misconception of the application of the colloquial name. The name " mangosteen " is in reality specific, and there are no good grounds for considering or using it as if it were generic. The idea obtained here that any species of the genus *Garcinia* was entitled to the name " Mangosteen," instead of only *G. mangostana*; hence the fruit of *Garcinia xanthocymus,* or, as it was known here for some time, *G. cochinchinensis,* from being looked upon as *a* mangosteen, possibly became to be considered *the* mangosteen.

If the term "Queensland mangosteen " could be applied to any species of this genus, it surely should be to *G. Mestoni,* which is indigenous to these parts, being found on the upper slopes of the Bellenden-Ker Mountains, whence a specimen was obtained and is now thriving at the Kamerunga State Nursery.

This fruit (*G. Mestoni*) varies much in size, often growing considerably larger than either *G. mangostana* or *G. xanthochymus.* It is shaped like the former and displays the peltate stigma in a similar manner, but is thin skinned, and has a greenish yellow pulp of an acid flavour not unlike the latter.

The Cochin-Goraka (*G. xanthochymus*), being a much hardier species than the Mangostana, presented but little difficulty in acclimatisation in North Queensland. A considerable number of trees in various parts of the country north of about latitude 21 have during the last ten or fifteen years matured and borne heavy crops of their thin-skinned, pointed, yellowish-green fruit.

The mangosteen (*G. mangostana*) is, on the other hand, a notoriously difficult tree to propagate and especially to bring to fruition in a new country. Several trees do, however, exist here; but only one so far—that at the Kamerunga State Nursery—has as yet flowered and produced fruit. That the true Java mangosteen has not only been successfully introduced into North Queensland, but successfully brought to maturity and fruition, for which the credit largely lies with the present manager of the Kamerunga State Nursery (Mr. C. E. Wood), there is no question.

To those who know the tree and its fruit, the illustrations will be conclusive evidence. To those who in this country only know of the fruit by name and repute, the same illustrations will indicate the very considerable and obvious difference between this, the true mangosteen, and the so-called Queensland or any other mangosteen; and shortly, it is hoped, the proof, if any further is needed, will be made complete by the existence and exhibition of locally-grown examples of the far-famed fruit itself.

As, however, it is evident that many do not know this fruit, a short description of it will not be out of place. *G. mangostana* is a much more

PLATE 56.—THE TRUE JAVA MANGOSTEEN (GARCINIA MANGOSTANA), AT THE KAMERUNGA STATE NURSERY, CAIRNS.
(The first of the species to bear in Australia.)

delicate tree than *G. xanthochymus*, and not so large. In foliage it is very similar, though the leaves do not attain the side of the latter. Apart from technically botanical differentiation of the species, the most obvious difference is in the fruit, which in this case is the shape of an apple and about 3 in. in diameter, though the size may vary considerably. Externally, the most noticeable features are the adherence of the sepals to the maturing and often to the matured fruit, while the opposite end of the fruit shows very distinctly the permanent, peltate, 6 to 8 or 9 lobed stigma. In colour it also resembles a very rosy and uniformly coloured apple, though it is often a darker and almost purplish red. When cut open, the pericarp or rind is found to be about ½-in. thick, and of the consistency of a firm apple when fresh. This hardens as it dries, but is at no time edible. When bruised, the rind often exudes a yellow sap which is bitter to the taste. This sap, though of little value

PLATE 57.—FLOWER BUD AND BLOSSOM OF G. MANGOSTANA.

in this species, is one of the characteristics of the genus, and in other species supplies a dye and species of gamboge. In the Cochin-Goraka this pericarp is the edible portion, but in the *true* mangosteen is only used medicinally by natives. The edible portion of the *G. mangostana* consists of a soft white substance surrounding the seed, which is unquestionably delicious, and cannot be described by comparison with any other known fruit or fruits. This, occupying the middle of the fruit, if the rind be opened by a transverse cut and carefully lifted off, appears dome-shaped, in quarters or divisions, and something like, only much softer than, a newly-peeled orange. These sections correspond in number to the stigmata on the shell, and each contains a largish seed (two generally being larger than the others in each fruit and which only are fertile), leaving comparatively little edible matter. The contrast in colour of the pure white contents with the purple-red of the

rind and the general appearance of the fruit, is in itself pleasing and appetising. Unlike so many of the tropical fruits, even the mango, it appeals to the palate from the first moment of tasting, no one having ever been heard to suggest the necessity for an "acquired taste" to enjoy its luscious contents.

Such is the mangosteen. In quantity each fruit contains but little edible substance, but of the delicate flavour of what there is most eulogistic opinions are recorded. It is called the "king of fruits"; "chief of the three finest fruit in the world" (the others being the pineapple and cherimoyer); "the pride of the Malay Islands, and perhaps the most delicious fruit in the world" (Marsden); "far-famed as one of the most delicious fruits of the tropics, and a delicate and general favourite" (Macmillan), &c.

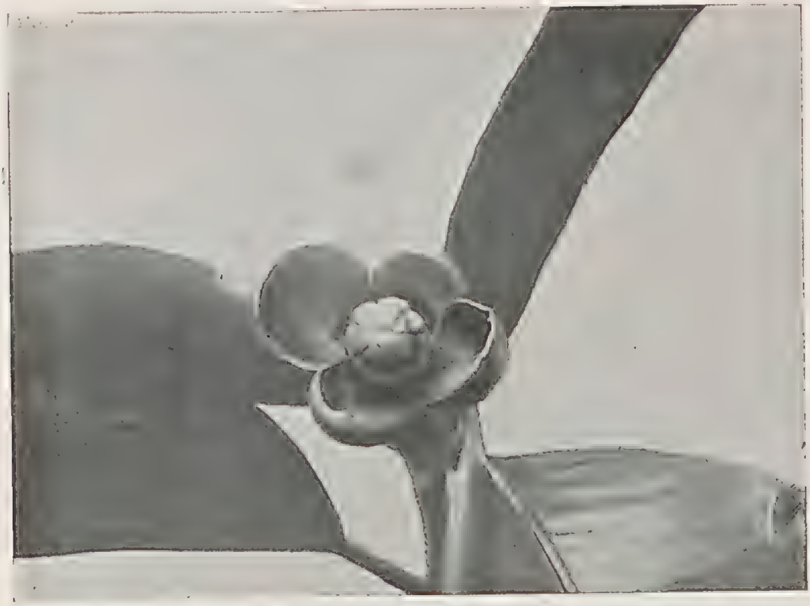


PLATE 58.—YOUNG FRUIT OF G. MANGOSTANA, SHOWING ADHERING SEPALS, AFTER PETALS HAVE FALLEN.

Being thought so much of, high prices are paid for the fruit. Where comparatively plentiful and in the season, 1s. to 1s. 4d. a dozen is obtained, and fine specimens grown by the writer in Southern India, either early or late in the season, have fetched as much as 4d. each. In the matter of transport in this country it is thought the mangosteen, though susceptible to bruising and comparatively quickly perishable, will, if it becomes at all popular as it should, lend itself to transport to the more temperate parts of the Commonwealth better than the mango, on account of its thicker and tougher skin; and the fact, that being rarer and higher priced, it will admit of greater care and attention in packing.

The introduction and propagation of this valuable fruit from its natural habitat in the Malayan Peninsula to other countries, even though apparently similar soil and climatic conditions may be obtained, has always been a difficulty. Even on the spot it is not an easy plant to

germinate or establish. Until a few years ago the statement was made that " so wedded is it to its indigenous soil and climate, that the innumerable attempts made to cultivate it elsewhere have uniformly failed." More recently, no doubt with an increased knowledge of tropical horticulture, special attention, and persistent effort, success has been met with in a number of instances. All tropical horticulturists agree, however, that it is one of the most difficult plants to acclimatise or bring to maturity, especially in a new country. The fact of this having been done in Queensland, therefore, should be a matter of congratulation, and its final attainment, after much trouble and long waiting, at the Government State Nursery by its manager (Mr. C. E. Wood) an achievement of some moment worthy of record.

The mangosteen requires a rich and moist but well-drained soil, protected situation, and a humid climate. Normally it takes eight to

PLATE 59.—FRUIT OF G. MANGOSTANA ABOUT HALF-GROWN. END VIEW, SHOWING PERMANENT PELLATE STIGMATA.

nine years to give its first fruits, but in new countries and situations often much longer.

The specimen at Kamerunga was germinated from seed received in the unopened fruit from Batavia on 18th October, 1891. Of a number of plants then raised, all sooner or later perished save only this one. Four planted in the field on 3rd March, 1893, and two in the bush-houses, lived for seven or eight years; but only one in the field was surviving ten years later. This, having attained a height of nearly 7 ft., was accorded special attention at the hands of the manager (Mr. C. E. Wood), with the result that three years later—*i.e.*, on 27th January, 1913, flower buds made their appearance, sixteen of which opened and set by the 19th February. The tree was, therefore, twenty-two years old when it came into bearing, and is the first to do so, so far as we are

aware, in this country. It is now healthy and vigorous and appears quite established and acclimatised. As can be seen from the illustrations, it presents no appearance of having been checked or retarded in its growth, but having made steady though irregular and very slow progress has merely been excessively deliberate in its development and tardy in adapting itself to the climate and locality.

How long it would have taken to put out flower buds had it not been for the special encouragement, attention, treatment, and protection afforded it during the past three years, it is, of course, impossible to conjecture, but the very length of time it has taken makes the satisfaction to the Department and the manager the greater in having ultimately attained success.

Now that there is every reason to anticipate that locally produced and therefore acclimatised seed will be obtained, it is thought that new plants may be brought to maturity in at least the normal periods.

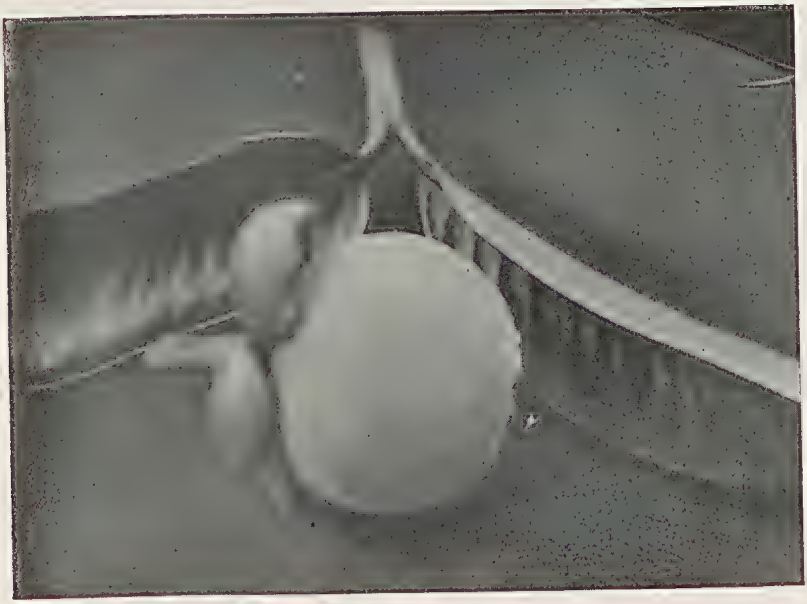


PLATE 60.—FRUIT OF G. MANGOSTANA. SIDE VIEW, SHOWING THE ADHERING SEPALS.

Wherever introduced into new countries, the mangosteen has taken longer, and in some instances, as in this case, very much longer, to bear its first fruits than in its own country. As already stated, its successful reproduction is comparatively recent. In this connection the record of its introduction to England (from the West Indies), probably for the first time, as given in the Bulletin of the Royal Gardens, Kew, in 1898, is of interest. Therein it states:—" Plants of this well-known and delicious tropical fruit have been widely distributed from Kew to the West Indies. The mangosteen is a native of the Molucca Islands, and is cultivated in the Straits Settlement, Java, and in one or two localities in India and Ceylon. The fruit is regularly shipped from Singapore to the Calcutta market. The first West Indian fruits were produced at the Botanic

Gardens, Trinidad, in 1875. In September, 1891, the Governor of that island forwarded some West Indian mangosteens for presentation to Her Majesty the Queen. The mangosteen fruited for the first time in the Jamaica Botanic Gardens in 1886. Last year (1897) a box was received at Kew from Mr. J. H. Hart, F.L.S., of Trinidad, containing nine fruits of mangosteen, which were perhaps the first to reach this country in a condition to allow their merits to be appreciated. Each fruit was separately packed in a compartment with pine wool. Owing to the firm consistency of the outer wall of the fruit, it appears to travel well. The fruits were distributed to the Secretary of State for the Colonies and others. The reports received were uniformly favourable."

The illustrations depict the tree at the time of bearing, the flower bud, blossom, the embryo and the half-grown fruit in various positions.

The photographs of the flowers and fruit are about one-half natural size. The flower buds developed rapidly from the time they made their first appearance. The stalk is short. The buds are a pale-green colour, and the size of a marble when mature and almost as completely spherical. The point of contact of the sepals is only slightly indented, but is clearly marked by a line of vivid red colour.

The open flower was over 2 in. across, and the four petals of a waxy appearance, rather thick, slightly wrinkled in parts and of a pale pink colour. These usually fell off within twenty-four hours of opening, and sometimes within a few hours, leaving the sepals protecting the embryo fruit. The sepals were then seen to be a reddish-brown on concave side, while remaining a pale-green on the convex. They retain their cup-like shape until the fruit matures, but for a long time seem unduly prominent. The young fruit, from a greenish-yellow at first, gradually assumed a pale-green colour almost *eau-de-nil,* and when half grown and some 1½ in. in diameter only showed faint indications of the colour they would be when mature.

A history of the mangosteen in Queensland, so far as can be ascertained, and of the specimen at the Kamerunga State Nursery, including details of measurements, growth, and treatment accorded it, is appended, and will be of interest to students and tropical horticulturists, both professional and amateur.

PRUNING FRUIT TREES.

The peach tree is almost universally grown on station, farm, and garden throughout Queensland, and, except in the case of expert orchardists, is as universally neglected as to pruning, with the result that the fruit is often produced in large quantities, but of small value either for sale or even for home consumption. This state of affairs can easily be rectified by the exercise of common sense, and by attention to the simple rules given in such publications as that of Mr. W. J. Allen, extracts from which were published in the April-June quarter of "The Fertiliser," issued by George Shirley and Co., Ltd., Sydney, N.S.W., and which we reproduce in the "Q.A.J." for the benefit of all who desire good crops of good fruit from healthy trees.

THE OBJECTS OF PRUNING.

(From Extracts taken from Mr. W. J. Allen's Book).

Wickson, in his work on Californian fruits (third edition) has so ably described the practical purposes of pruning that I feel I cannot do better than quote such portions as fit in with our requirements here in New South Wales:—

"One of the first things for the beginner to undertake as he approaches the practice for pruning trees and vines, is to form some conception of the purposes to be served. Imitation is not the foundation of intelligent pruning, though it yields many valuable suggestions. Satisfactory work rests upon a correct understanding of the reasons for each act, and to the attainment of this all study, observation, and experience should tend. Possessing this, one can proceed capably, modifying method to meet condition, and producing desirable results. Receive all suggestions, and then go quietly to the tree, and study your problem in its shade. The tree is the best revelator of its needs. Some of our best pruners are men who were untrained to horticulture before they entered upon their orchard work. Reading, discussion, and systematic instruction, are all valuable. They save much time and many errors; but recourse to the tree affords the sovereign test of attainment. These may be counted among the practical purposes to be attained by pruning: (*a*) convenience of the grower; (*b*) health and strength of the tree; (*c*) regulation of heat and light; (*d*) attainment of strong bearing wood; (*e*) attainment of size in fruit; and (*f*) promotion of regular bearing.

"On examining the tree, it will be found to be composed above ground of a trunk from which the main branches spring, which, in their turn, produce the laterals, on which the shoots and spurs which bear the fruit are to be found. Taking these points into consideration, one can hardly fail to secure rays of light upon the subject of pruning which seems dark to so many.

"*Convenience.*—Trees which branch near the ground are most quickly and cheaply handled in all the operations of pruning, spraying, fruit thinning, and picking. Low trees, with obliquely rising branches, are more easily cultivated than any form with horizontal branches unless the head is carried so high that the teams pass easily under the tree. To do this sacrifice all the other conveniences and economies which actually determine profit, and is really out of the question from a commercial point of view.

"*Health and Strength.*—It is imperative in most parts of this State that the sunshine be not allowed to touch the bark during the heat of the day. This protection is secured even for young trees by low branching. The low tree, with properly spaced branches, attains superior strength by virtue of thick, strongly-knit, short growth between branches, and by its strong, stiff, obliquely-rising growth, sustains weight which brings horizontal branches to the ground, and thus even high-headed trees are liable to continually increasing interference with cultivation, and the desperate grower has to raise the head of his tree higher in the air, and

further above the profit line, while at the same time he renders it more liable to sunburn, to bark-binding, and to unthrift, by forcing the sap to flow an unnecessary distance, and through wood and bark which impede its movement. Besides, a low tree escapes stress by strong winds which a high tree invites, and at the same time is less able to withstand. Pruning for health and strength of the tree also includes the removal of unthrifty or diseased parts, which are not only an encumbrance to the tree, but may communicate to the other parts the causes of their ill-condition.

"*Heat and Light.*—The maintenance of strong-bearing wood in the lower part of the tree is conditioned upon the proper pruning of the top of the tree. How far the upper levels or the shade layer of the tree can be safely opened depends upon the local climate in each fruit region. The rule must be: the higher the summer heat, the denser the tree; the lower the heat, the thinner the tree; but everywhere the proper condition of openness must be constantly in view in pruning. Not alone must this be done to maintain thrifty growth below, but it is also essential to the best growth and ripening of the fruit in the lower and interior parts of the tree. Fruit inferior in size, colour and quality results in part from lack of pruning to regulate the admission of light and heat—sometimes one, sometimes both—to the shaded portion of the tree.

"*Bearing Wood.*—Good fruit develops on good bearing wood, and good bearing wood is the product of proper degrees of light and heat, as has just been urged; but bearing wood in the case of some fruits is new wood, and the reduction of old wood for the purpose of forcing the growth of new wood must be constantly in mind. Renewal is more or less a consideration with all trees, and especially the securing of strong new wood. This is a point upon which close study of the bearing tree will yield most satisfactory suggestions.

"*Size of Fruit.*—The size of fruit, providing the tree is healthy and vigorous, depends upon the character and amount of bearing wood which the tree is allowed to carry. Removal of part of the fruit burden is done by thinning after it is well set; but this labour should always be minimised by antecedent pruning, which adjusts the retention of bearing wood, according to the vigour, size, and bearing habit of the tree. Thinning out of bearing shoots and spurs, when either are clearly seen to be in excess, should be the constant study of the pruner.

"*Regular Bearing.*—This point is largely involved in the preceding, and affords an additional incentive. Regulating the amount of fruit borne in one year involves the profit of two years, because a tree cannot produce an excessive amount of good fruit and perfect fruit buds for the following year. It may generally make buds which will bloom, but not always that. If it does make the bloom, it is no guarantee that the bloom will be strong and effective for bearing. Consequently, pruning for reasonable amount of bearing should always be borne in view, and should be practised at the close of the year of non-bearing with particular diligence, if the alternate year bearing habit is to be broken up."

While there are many who neglect to follow any system of pruning, there are others, again, who, with the very best intentions, carry this important operation to excess by continuing to prune too heavily for, at

any rate, a few years, certain kinds of trees after they have reached the age when they should begin to carry fruit. In making up our minds to follow any system, we should never lose sight of the commercial side of the business; and any system which encourages excessive growth rather than fruit-buds and spurs, and prevents the tree from fruiting, should be avoided. The system to follow is that which will aid the tree in producing annually the greatest quantity of highly-coloured marketable fruit, and which, at the same time, involves the least training and pruning during either summer or winter, rather than one which entails much labour after once the tree has attained the bearing age.

The growing and pruning of trees is no longer a hobby with most of our fruitgrowers, but a commercial undertaking, and the grower should not go to the expense of doing more pruning during summer or winter than is absolutely essential for the purpose of properly spacing the limbs, and preserving a reasonable amount of bearing wood.

The following appears in "Bailey's Cyclopædia of American Horticulture":—

"Fruit trees are pruned for the purpose of enabling them to produce a superior quality of fruit. They are not pruned primarily to assume any definite or preconceived shape. It is best, as a rule, to allow each variety of tree to take its own natural or normal form, only pruning it sufficiently, so far as shape is concerned, to remove any unusual or unsymmetrical growths.

"1st. The fundamental conception in the pruning of fruit trees is to reduce the struggle for existence, so that the remaining parts may produce larger and finer fruits.

"2nd. The result of pruning fruit trees should be to keep the tree in bearing condition, not to force it into such condition. If the tree has received proper care from the time it is planted it should come into bearing when it reaches the age of puberty. Pruning, therefore, is merely a corrective process, and keeps the tree in proper bearing condition. When trees have been much neglected, pruning may be the means of reinvigorating them and setting them into a thriftier condition. In such cases it is one of the means of renovating the tree, as tilling, fertilising, and spraying are.

"3rd. Heavy pruning of the top tends to produce wood. This is because the same amount of root energy is concentrated into a smaller amount of top, thereby causing a heavier growth. This is particularly true if the pruning is done when the plant is dormant.

"4th. Heavy pruning of the root tends to lesson the production of wood, because the same amount of top receives a less supply of soil with its content of plant food.

"5th. Trees which grow much to wood are likely to be relatively unproductive. It is an old maxim that checking growth induces fruitfulness, so long as the plant remains healthy. If the tree is thrown into reduntant growth every two or three years by very heavy pruning it tends to continue to produce wood at the expense of fruit. When a tree is to be brought into bearing condition by general good treatment, the aim should be to keep it in that condition by a relatively light annual pruning. Violent pruning is allowable only when trees have been

neglected, and it is necessary to bring them back into bearing condition, or to renew their tops.

"6th. The operator should know where the fruit-buds are borne before undertaking the pruning of any fruit tree, otherwise he may destroy too many of them. If he knows the position of the fruit-buds he may prune in such manner as to thin the fruit even without the removal of much wood, and thereby to reduce the struggle for existence to a minimum. Every species of tree has its own method of fruit-bearing. The pear bears its fruit largely on old spurs. The peach bears on the wood of the last season's growth. In order to thin the fruit of the pear by pruning, therefore, it is necessary to remove part of the spurs. In the peach it is necessary to cut out or to cut back a part of the previous year's growth. Each species of plant is a law unto itself in these regards.

"7th. Heading-in tends to promote fruitfulness, particularly in those trees that are growing over-rapidly. If the heading-in is very severe, however, it may amount to a heavy pruning; and in that case it may set the plant into wood-bearing rather than into fruit-bearing. It is not to be supposed, however, that heading-in is necessarily to be advised in order to make trees bear. They may bear just as well if they are never headed-in, provided they are otherwise well pruned and cared for. Whether one shall head-in his fruit trees or not is a personal question. If the trees are growing too rapidly, it is well to head them in in order to check their ambition.* This is particularly necessary when trees are growing on heavy or very fertile soil and tend to overgrow. In such case, cutting off the strongest leaders and leaving the weaker ones may induce greater fruitfulness.

"8th. Pinching-in the annual growths in early summer tends to augment development of fruit-buds, although these buds may not be developed the very year in which the pinching-in is done. This is a special practice, however, which can be employed only in small areas and with particular trees. It is essentially a garden practice and not an orchard practice. In the orchard one must depend for fruitfulness upon the general good care of the plantation, and in this case pruning is one of the essential factors.

"9th. Pruning fruit trees usually resolves itself into a thorough and systematic thinning out of the weak, imperfect, and interfering branches. Thereby the energy of the plant is saved, and is deflected to those parts that are capable of bearing a useful product; the sun and air are admitted; the tree becomes manageable for spraying and for picking; all the fruits have an opportunity to develop. How much or how little to thin is wholly a local question. In humid climates, much thinning may be necessary. In dry, hot climates as on the plains—but little thinning is allowable, else the branches may sun-scald."

The foregoing are among the practical purposes to be served in pruning, and it will be seen that there are various ends to attain; therefore, have an ideal towards which to work, and always have an object

* We do not fully agree with Mr. Bailey in this regard. If a tree has reached the age when it should be bearing, but continues to make excessive wood instead of throwing out fruit-spurs, the system followed by us is to give the tree little if any cutting-back for a season.—W. J. A.

in view when severing branches, shoots or spurs from any portion of the tree. Never by any chance lose an opportunity of picking up any points from your neighbour, but don't attempt to follow everybody's advice.

RATIONAL PRUNING.

Pruning to obtain a low head is applied to different varieties of trees. If dealing with a two or three year old nursery tree it may be advisable to leave either three or four short stems (as shown in Figs. 1 and 2), as it is found that if the head is cut away, and only a straight trunk left, the top of the tree may not shoot, but will die, and the tree shoot from the root. This is often the case with the peach, but where a few new shoots are left this danger is avoided. If a well-grown yearling tree it would be preferable to cut back to a single stem (Fig. 3).

Figures 4, 5, and 6 show how the same trees should appear after the first summer growth and before the second pruning.

Figures 7, 8, and 9 show the form of tree after its second pruning. Figs. 10, 11, and 12 show the same trees as they should appear just before the third pruning; 13, 14, 15 after the third pruning; 16, 17, 18 the well-formed tree as it should appear about the third year from planting.

This form of pruning is practised in the departmental orchards with but little alteration on the apple, peach, apricot, plum, prune, pear, nectarine, and quince, but with either the fig or cherry very light pruning only is required after the first year.

Space will not permit of full details, but we advise all growers to secure Mr. Allen's good work on pruning, as it is printed in simple language, and thorough as to details.

Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4

Fig. 5.

Fig. 6.

Fig. 7.

Fig. 8.

Fig. 9

Fig. 10.

Fig. 11.

Fig. 12.

Fig. 13

Fig. 14.

Fig. 15.

Fig. 16.

Fig. 17.

Fig. 18.

Tropical Industries.

CANE ROOT GRUBS.

The annual report of the Local Agricultural Department of Barbados, West Indies, for 1912, contains a very interesting report on the investigation of the habits of cane root grubs, especially those of the root borer, or "lady-bird." That part of the report under the head of

FIELD INVESTIGATION OF BEETLE GRUBS ATTACKING THE ROOTS OF SUGAR-CANE

will no doubt be interesting to those engaged in sugar cultivation in Queensland:

FIELD INVESTIGATION OF BEETLE GRUBS ATTACKING THE ROOTS OF SUGAR-CANE.

Since February, 1912, a systematic inquiry involving weekly field work has been made into the habits of cane root grubs, especially those of the rootborer, or "lady-bird" (*Diaprepes abbreviatus*, Linn.). The life history of this insect has been worked out by the Rev. N. B. Watson, F.E.S. (West Indian Bulletin, Vol. IV.), but there is still much information to be gained as to its position at various times of the year in relation to the crops attacked. The investigation is naturally still far from complete, but some points of interest may be discussed at this stage. The work has mainly been done at Spencers Plantation, Christ Church, which is situated in the area known to be most affected by this pest at the present time. The thanks of the Department are due to Mr. A. A. Evelyn, the manager of the estate, for having afforded every facility for the inquiry and for the keen personal interest he has taken in it, which has led to many helpful suggestions.

The period covered so far began with the crop season, and the most interesting questions which have arisen have been in connection with the effect of reaping the canes and the digging of the stumps. The grubs when feeding are found in or near the cane stools, many of them in tunnels in the bases of the canes. In the ordinary course of events, as they become fully fed, they disperse in search of moist soil in which to pupate. Where the soil is heavy and retentive, few penetrate deeper than 1 ft., but in dry situations, as, for example, the margins of a steeply banked field, they may go into the third foot from the surface. They penetrate the stiffest moist clay with ease. They shape out a very regular oval cell, and in this they can remain a long time either as grubs, or, after the short pupal stage, as fully formed beetles. They have been found in the latter condition from the beginning of April on. Large numbers emerge after the first heavy rain in May or June, and are then found feeding and pairing on the leaves of sugar-cane, pea trees, Indian corn, and Guinea corn.

After the canes are cut, the stumps soon dry up and become infested with weevil borer (*Sphenophorus sericeus*, Oliv.), and at this stage very few root-borer grubs have been found in or about the stools. Careful search shows them to have dispersed in every direction through the soil, some as far as the middle of the bank separating two clumps of canes. It has been found that under these conditions the immature grubs form cells similar to those in which pupation takes place, in which they are able to remain without food for a period whose limit is not yet determined, but which is known to extend over more than three months. Half-grown larvæ kept in captivity without food since 17th April were still alive on 10th August, and digging operations in the latter month showed that there were still a number of resting larvæ at a considerable depth beneath the situations of cane stools dug up in the early months of the year. Larvæ taken from such cells have commenced to feed again when supplied with sweet potato or sugar-cane. In view of this dispersal, it is clear that to be effective as a remedy the uprooting of the stumps must follow promptly on the cutting of the canes, and that badly-infested fields should be reaped as early as possible in the season. The stool should be dug out entirely with as many as possible of the surrounding roots. A number of grubs are usually exposed in the operation, and if the stumps are left on the ground to dry up those feeding within issue from them. Reliance has been placed on ants and blackbirds to destroy these. Unfortunately, according to my observations, though the blackbirds are generally on the spot when digging is going on, they only pick up the exposed grubs and make no attempt to search for those which have taken shelter, as they very quickly do. The ants destroy some, but are often wanting. A few head of poultry would be more effective than either. To get anything like the full benefit from digging stumps, they should be collected while still fresh and stacked on dry rocky ground, which will afford the grubs no shelter. In any case it is certain that a large number of grubs escape the operation, but their food supply is cut off and their development stopped for the time being. The length of time they can live without food is as yet undetermined, and, although it appears quite possible that some may continue to exist until the new crop is available, we may assume that the chances of such a transition must be fatal to many. Direct observation seems to show a considerable diminution of the grubs where stumps have been dug soon after reaping.

Probably the most hopeful means of checking the pest is to be found in the collection of the beetles. From the beginning of April onwards, careful watch should be kept, especially after rain, and the beetles collected as soon as they emerge. They may be commonly found, often in pairs, hidden in the leaf bases of sugar-cane, Guinea corn, and Indian corn. Their presence may often be detected by the indentations caused by their feeding on the edges of the leaves. They may also be collected from pea trees or other vegetation on the borders of the field. At Spencers this year, 9,600 were collected by boys in the course of one week. Those on the canes are most difficult to find, but obviously it is most important that they should be carefully gathered.

The position in which the eggs are laid on the canes has been discovered during the investigations. They are found towards the tips of the leaves, which are generally more or less split by the action of the wind. The beetle conceals its eggs between two overlapping split portions, which it firmly cements together. There is so little sign of their presence that the collection of the eggs does not afford a practical means of control.

Undoubtedly, where it is practicable, the most effective means of dealing with this as with other local pests and diseases of sugar-cane is the practice of rotation of crops. It is significant that in the eastern portion of the estate at Spencers, where the suitability of the ground for cotton-growing has led to the alternation of that crop with sugar-cane, the root-borer is insignificant or absent.

It is only where root-borer is present in some abundance that it can be regarded as a serious pest, and where it does become abundant it can undoubtedly be checked where the trouble is taken to do it. This involves some amount of deviation from estate routine, but that should not be impossible. It is not by casual measures taken when it happens to be convenient but by vigorous action at the right time that success can be obtained.

TIMES OF SUNRISE AND SUNSET AT BRISBANE—1913.

Date.	May.		June.		July.		August.	
	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	6·13	5·16	6·30	5·0	6·39	5·3	6·30	5·18
2	6·14	5·16	6·31	5·0	6·39	5·4	6·30	5·19
3	6·14	5·15	6·31	5·0	6·39	5·4	6·29	5·19
4	6·15	5·14	6·32	5·0	6·39	5·4	6·29	5·20
5	6·15	5·13	6·32	5·0	6·39	5·5	6·28	5·20
6	6·16	5·13	6·33	5·0	6·39	5·5	6·27	5·21
7	6·16	5·12	6·33	5·0	6·39	5·6	6·26	5·21
8	6·17	5·11	6·33	4·59	6·39	5·6	6·26	5·22
9	6·18	5·10	6·34	4·59	6·39	5·7	6·25	5·22
10	6·18	5·10	6·34	4·59	6·39	5·7	6·24	5·23
11	6·19	5·9	6·35	4·59	6·39	5·7	6·23	5·23
12	6·19	5·8	6·35	4·59	6·38	5·8	6·22	5·24
13	6·20	5·8	6·35	4·59	6·38	5·8	6·22	5·24
14	6·20	5·7	6·36	4·59	6·38	5·9	6·21	5·25
15	6·21	5·7	6·36	5·0	6·38	5·9	6·20	5·25
16	6·22	5·6	6·37	5·0	6·37	5·10	6·19	5·26
17	6·22	5·6	6·37	5·0	6·37	5·10	6·18	5·26
18	6·23	5·5	6·37	5·0	6·37	5·11	6·17	5·27
19	6·23	5·5	6·37	5·0	6·37	5·11	6·16	5·27
20	6·24	5·4	6·37	5·0	6·36	5·12	6·15	5·28
21	6·25	5·4	6·38	5·0	6·36	5·12	6·14	5·28
22	6·25	5·3	6·38	5·0	6·36	5·13	6·13	5·29
23	6·26	5·3	6·38	5·1	6·35	5·13	6·12	5·30
24	6·26	5·3	6·38	5·1	6·35	5·14	6·11	5·31
25	6·27	5·2	6·39	5·1	6·34	5·14	6·10	5·31
26	6·27	5·2	6·39	5·1	6·34	5·15	6·9	5·31
27	6·28	5·2	6·39	5·2	6·33	5·15	6·8	5·32
28	6·28	5·1	6·39	5·2	6·33	5·16	6·7	5·32
29	6·29	5·1	6·39	5·2	6·32	5·16	6·6	5·32
30	6·29	5·1	6·39	5·3	6·32	5·17	6·5	5·33
31	6·30	5·0	...	...	6·31	5·17	6·4	5·33

PHASES OF THE MOON.

			H.	M.
6 May	●	New Moon	6	24 p.m.
13 ,,	☾	First Quarter	9	45 ,,
20 ,,	○	Full Moon	5	18 ,,
28 ,,	☽	Last Quarter	10	14 a.m.
5 June	●	New Moon	5	57 a.m.
12 ,,	☾	First Quarter	2	37 ,,
19 ,,	○	Full Moon	3	54 ,,
27 ,,	☽	Last Quarter	3	41 ,,
4 July	●	New Moon	3	6 p.m.
11 ,,	☾	First Quarter	7	37 a.m.
18 ,,	○	Full Moon	4	6 p.m.
26 ,,	☽	Last Quarter	7	59 ,,
2 Aug.	●	New Moon	10	58 p.m.
9 ,,	☾	First Quarter	2	3 ,,
17 ,,	○	Full Moon	6	27 a.m.
25 ,,	☽	Last Quarter	10	18 ,,

Forestry.

BURMESE TEAK.

(*TECTONA GRANDIS*).

By HOWARD NEWPORT, Instructor in Tropical Agriculture, Cairns.

Now that an interest in reafforestation work is being awakened, and the public, in the North at any rate, are beginning to in some measure appreciate the fact that the more valuable timbers are decreasing in quantity, a fact evidenced by their increasing in price, the question

PLATE 61.—A BRANCH OF THE BURMESE TEAK TREE IN SEED.

naturally arises as to what class of timber and what sort of trees may be advantageously used for such afforestation work. It might be contended that obviously the trees to replant are those being decimated, or at least others with them that are similarly indigenous and therefore, *ipso facto*, suited to the locality and climate. Certainly these should not be neglected, but why not simultaneously utilise plants—in this case timber trees—that are of recognised value the world over? This continent of Australia is peculiar in its flora in many respects, and because a plant is not indigenous it must not be thought it will not thrive. Many valuable plants and trees are no doubt difficult to introduce, acclimatise, and successfully establish; but there are more that are only too ready to become naturalised, and of which many instances will occur to readers.

This implies that due caution must be exercised for fear a stranger thus introduced may become too familiar, but in selecting trees of known value as timber there is much less risk than with the smaller plants.

In this respect the world-renowned Indian, Burmese, or Moulmein teak, as it is variously called, on account of its many uses and high value as a timber for use in the tropics as well as for export, is worthy of consideration. This tree is not new to the country. Its value has been recognised, and here and there a few trees exist, but its use in reafforestation work on any extensive scale does not appear to have been thought of. The Indian teak was first imported into Queensland, according to Mr. J. F. Bailey, by the Botanic Gardens of Brisbane, from India in 1856, and seedlings were distributed in 1875. Presumably some of these trees are still living, which, if in suitable situations, it would be most interesting to obtain measurements of for purposes of record, for they would be thirty-eight years old and should be roughly 100 ft. high by 12 in. to 18 in. diameter. More recently, however, seed was obtained from Burma by the Kamerunga State Nursery in about 1905 or 1906.

PLATE 62.—THE FLOWERING HEAD OF BURMESE TEAK TREE.
(Spray is 3 ft. high, and shows both flower and seed.)

From these a number of plants were raised and distributed in the succeeding years. The illustration is one of this batch at the Kamerunga State Nursery. Some were sent to Herberton and other places on the plateau from 2,000 ft. to 3,000 ft. above sea level, which have done well, though not exhibiting so luxuriant a growth as these below the ranges or on the lower slopes and foot hills. These latter trees came into bearing in their fourth year, so that not merely has it been demonstrated that this valuable tree can be readily introduced and will thrive in our tropics, but a supply of home-grown and acclimatised seed is already, albeit in small quantity, available.

It is pleasing to be able to note that the fullest advantage is being taken of the local supply; all the seed available being sent to the District Forest Officer, who is germinating it for reafforestation work.

Kamerunga being a small institution, however, it was not possible to plant a separate plot or coppice of these trees exclusively, and the seed supply from the three specimens there, fine trees though they are, is hopelessly inadequate to make any showing in reafforestation work on the vast areas of forest reserves that might, and no doubt will be, dealt with.

That Burmese teak would be worth dealing extensively with in this manner would seem fully justified when its characteristics are considered. A dark-brown firm timber, containing a pleasant aromatic oil, it is as easily worked as good cedar. It is handsomely grained, tough, and particularly strong, coming next in the test to the West Australian karri, which is one of the strongest in the world. It may be used for cabinet-making, carving, or sash and door making, general house-building, and, on account of its small shrinkage, is valuable in coach-building. The aromatic oil it contains is disagreeable if not actually poisonous to white ants, which, though they will eat the sap wood, are never known to touch the heart wood. Hence it is largely used in the tropical, termite-infested countries in making door frames, window sashes, beams, and floors in concrete buildings. Its best known use however, is, of course, in ship-building. Despite the increased use of iron on the hulls of large ships, teak is still the timber *par excellence* for linings, decks, and rails. In smaller boats it is used throughout their construction, and its even more extended use is only restricted by its cost and limited supply.

Can any more valuable timber be imagined in the tropics of Australia, where wooden houses are at present the order of the day, and concrete (which is not in itself impervious to white ants) the coming building material; where, owing to the distances, transport of furniture and cabinet-work is risky and costly and locally-made material preferred; where wagons, carts and coaches must ever be a necessary adjunct to settlement; and where in a sea-girt continent the building of ships, schooners, cutters, fishing-boats, and ferries must rapidly increase and become an important factor in the country's development?

Sylviculture is hardly an industry for the individual. Timber-producing trees take too long to give returns to the planter of them. Returns worth mentioning are often not obtainable in less than a century, but when obtained the profits are large beyond belief. It is rather an investment for nations, States, or companies, who can afford to wait and who will yet be young when the trees now planted are ripe for use.

Teak is by no means one of the slowest-growing trees. Germination from the seed is often erratic, but once started the development of the seedling into a sapling is rapid. It likes a humid tropical climate and a rainfall over rather than under 50 in. per annum; one indispensable

PLATE 63.—BURMESE TEAK TREE (TECTONA GRANDIS), SIX YEARS OLD, AT THE KAMERUNGA STATE NURSERY, CAIRNS.

factor is a well drained, or even a dry, subsoil. In the natural state teak trees grow intermixed with other scrub and forest trees, but artificially made plantations of the one exclusive species have proved quite successful. Such plantations in India and Malaya are generally on the lower slopes and foot hills of the ranges, where the tree does better than at higher elevations. In Queensland, therefore, the best results might be expected below an altitude of 1,500 or at most 2,000 ft., and as far South, perhaps, as about latitude 21.

As the seedling attains a height of a few feet and the stem the thickness of a walking stick, it is exceedingly handsome. The leaves are of a startling size, many at Kamerunga being found to measure over 3 ft. in length and 2 ft. across. As the tree matures, the leaves, which are shed annually, average very considerably less, being seldom much more than 1 ft. or so long or wide..

A tree may be expected to attain a diameter of 18 to 20 in. or possibly 2 ft. under favourable conditions in eighty years. In Siam a teak tree of less than 4 ft. 6½ in. at 4 ft. 6 in. from the ground is not considered worth felling. When a tree is ready to be felled, the method in Burma is to "girdle" it and then let it stand for two or three years before actually falling and removing it. In this manner the timber is found to mature better and quicker than if felled at once. This girdling is more than the simple ring-barking operation commonly done in this country, as the whole of the sap wood has to be cut through with great care. A tree seldom falls of itself, and has practically always to be cut down even when left deeply rung in this manner for the full three years. This may, perhaps, be due in a measure to the fact that it is not a tree that grows to an immense height or seeks to outtop all other forest trees; 100 to 150 ft. is said to be a good height for an old teak.

In many oriental countries, in situations such as this tree likes—*i.e.*, the lower slopes of the mountains—it is a custom and a law that the users of land for agricultural purposes shall plant up teak on evacuating their clearings, and also that the timber-getter and cutters shall plant up one or more seedlings for every mature tree removed. A law simple in its execution, but of immense and lasting effect to the country and the nation who were, and are, far-seeing enough to enforce it.

To many of our timber-men the term "teak" will call to mind various local timbers. Several timbers in as many districts are known locally by this name, perhaps the best known of which is the Johnstone River teak (*Afzelia australis*), which, however, must not be confounded with the tree here described, and which I have called Burmese or Indian teak to emphasise the distinction. *Tectona grandis* is of the natural order Verbenaceæ, and none of this genus are recorded as indigenous to Queensland by our Colonial Botanist.

Botany.

CONTRIBUTIONS TO THE FLORA OF QUEENSLAND.

BY F. MANSON BAILEY, C.M.G., F.L.S., Colonial Botanist.

Order PITTOSPOREÆ.

CITRIOBATUS, A. Cunn.

C. multiflorus, *A. Cunn.* var. **intermedius,** *Bail. n. var.* (Plate 64). A large shrub or small tree; thorns scanty, sometimes almost wanting, much shorter than in the common form, leaves intermediate between the normal form and the *var. linearis.*

Hab.: Gayndah, *Dr. F. Hamilton Kenny.*

C. multiflorus, *A. Cunn.,* var. **linearis,** *Bail., n. var.* (Plate 65). A tall shrub or small tree. (It was the wood of this tree that was cut and described under No. 13A, *C. multiflorus,* in my "Catalogue

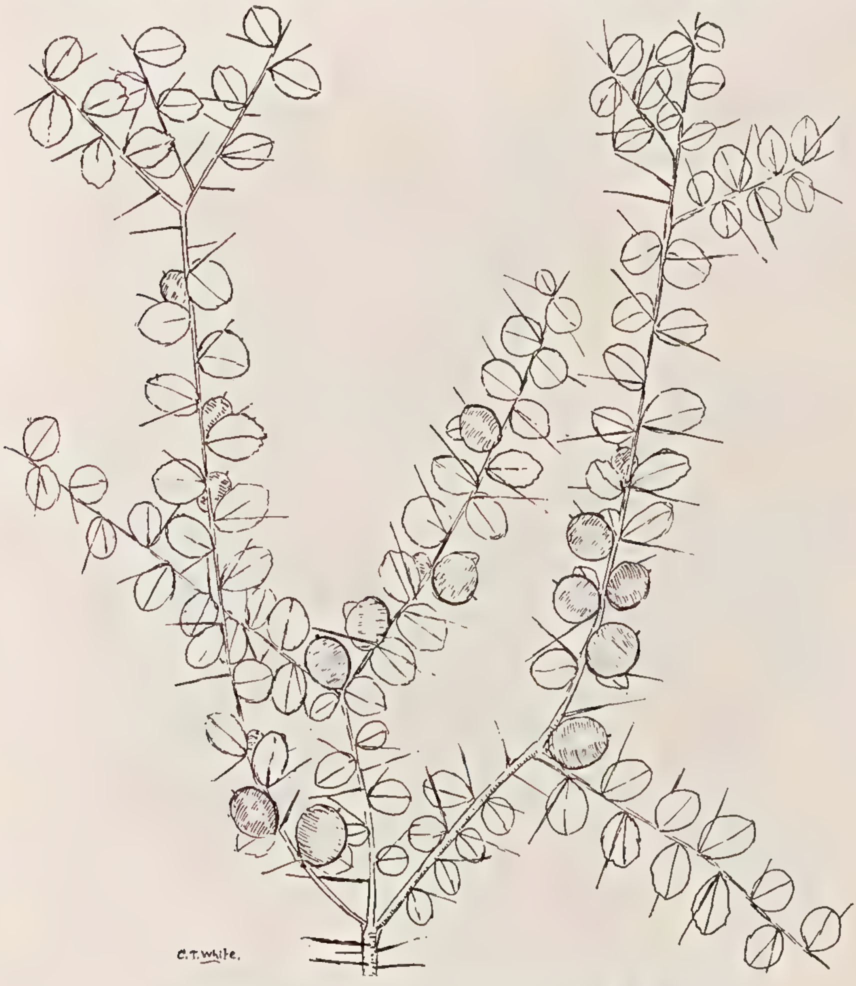


PLATE 64.—CITRIOBATUS MULTIFLORUS, *A. Cunn.*

PLATE 65.—CITRIOBATUS MULTIFLORUS, *A. Cunn. var.* INTERMEDIUS, *Bail. n. var.*

PLATE 66.—CITRIOBATUS MULTIFLORUS, *A. Cunn. var.* LINEARIS, *Bail. n. var.*

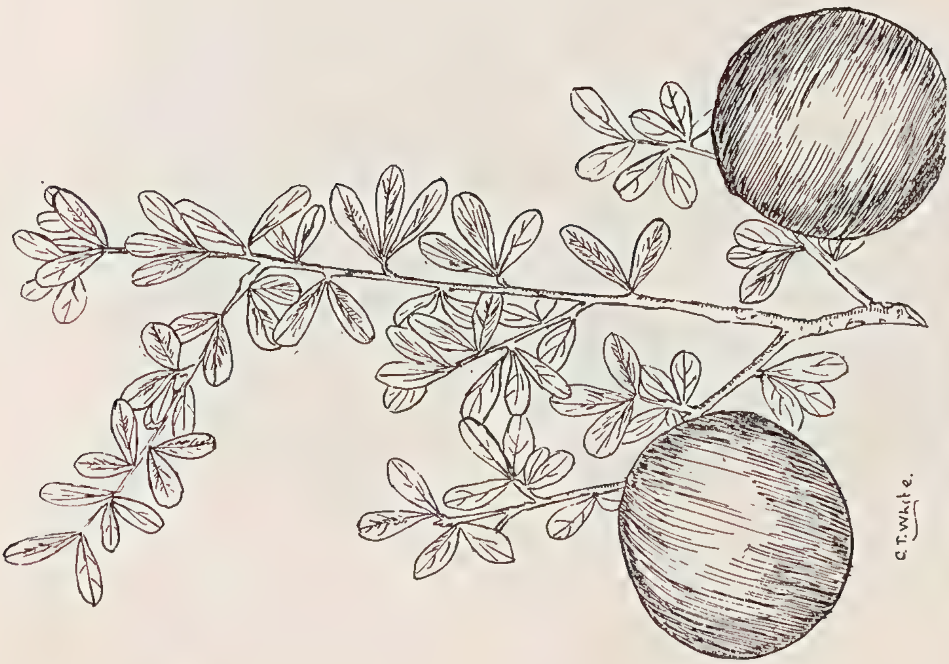


PLATE 67.—CITRIOBATUS PAUCIFLORUS, *A. Cunn.*

PLATE 68.—CITRIOBATUS PAUCIFLORUS, *A. Cunn.* *var.* KENNYI, *Bail. n. var.*

of Queensland Woods"). The distinguishing marks of this new variety are its more tree-like habit, fewer thorns, and the leaves being for the most part linear-entire, on very short petioles, an inch or more long and scarcely over 1½ line broad. Fruit size and shape of the normal form, full of a dark-coloured, watery, slightly viscid juice. Seeds slightly viscid.

Hab.: Main Range, *F. M. Bailey*; Rosewood, *C. T. White.*

C. pauciflorus, *A. Cunn.,* var. **Kennyi,** *Bail., n. var.* (Plate 67). A tall shrub or small tree differing in general appearance from the other forms, but not easy to state in words. The stems are more or less pubescent and seem to be thornless. Leaves puberulent, almost or quite entire, broadly cuneate, 4-8 lines long, 3-4 lines broad, rounded at the upper end. Petiole minute. Fruit (not seen ripe) terminal on the specimens examined, puberulous, the largest seen ½ in. diam., crowned by an erect slender column of about 2 lines, bearing the style and stigma. Seeds in a viscid pulp.

Hab.: Gayndah, *Dr. F. Hamilton Kenny.*

The two varieties here brought under notice may be those mentioned by Bentham in "Flora Australiensis," volume 1, page 122.

It may here be remarked that plants of this genus lend themselves admirably for forming both tall and short hedges, especially for large ornamental plantations.

BRISBANE BOTANIC GARDEN NOTES.

BY J. F. BAILEY, Director.

PALMS—(*continued from page* 320).

(WITH PLATES.)

Howea Forsteriana, or *Kentia Forsteriana,* as it is more commonly called, is the Thatch-leaf Palm of Lord Howe Island, and as a pot-plant is very popular for house decoration, and so great is the demand for it that many thousands are annually cultivated by our nurserymen. It is one of the few plants which will stand the unnatural conditions usually experienced in rooms of a dwelling-house. This palm is graceful from the seedling to the adult age, and is well adapted for outdoor planting, as will be seen by the accompanying illustration. The leaves are of a drooping habit, which is one of the characters which distinguish it from *Howea Belmoreana,* the Curly Palm, the leaves of which converge upwards. So far none of our plants have borne fruit.

The Coquito Palm of Chili (*Jubaea spectabilis*) is a noble tree, its thick, clean stem being adorned at the summit with a mass of gracefully arched foliage. In its native country a sweet syrup called "Miel de Palma" (palm honey) is prepared by boiling the sap of the tree to the consistency of treacle, and is much esteemed for domestic use as sugar.

The saccharine juice, however, can only be obtained by sacrificing the tree. Our specimen flowers regularly when it receives close attention by swarms of bees. About five years ago it bore a large crop of nuts, but has not fruited since. Some fine specimens of this palm are to be seen

PLATE 69.—HOWEA FORSTERIANA.

in the Botanic Gardens of the other States of the Commonwealth, therefore it ought to thrive in some of the cooler parts of this State.

Hyophorbe Verschaffelti is a handsome species belonging to Rodriquez. It has a thick, bulging stem, and broad leaves which have

a conspicuous yellow band running longitudinally along the centre of the stalk and axis of each; the segments have a prominent yellow midrib. Our plants bear an abundance of flowers each year, but so far the fruit has not matured.

PLATE 70.—JUBAEA SPECTABILIS.

The African Oil Palm (*Elaeis guineensis*) is represented here by several plants, young ones of which form very handsome specimens. The one here shown has been growing in the Gardens for over forty

years, but so far has not borne fruit, Brisbane probably being too far south for that purpose. According to Dr. Preus the Oil Palm is the only plant in the world which can, with the least possible care and without diminution of crop, furnish a rich harvest for many decades.

PLATE 71.—HYOPHORBE VERSCHAFFELTI.

The annual export of palm oil and kernels from Africa reaches an enormous amount. The trees at Kamerunga State Nursery, Cairns, have fruited for some years past.

PLATE 72.—ELAEIS GUINEENSIS.

Science.

BANANA MANURING EXPERIMENTS AT BUDERIM MOUNTAIN—SIXTH PROGRESS REPORT.

By J. C. BRÜNNICH.

During the past twelve months the weather conditions were favourable to the banana crop, thus giving the experiments every chance and producing heavy yields.

The results are given in tabulated form, and as our control over the first series has now ended, the yields for 1912 up to December and also up to the end of March, 1913, are given, as a large proportion of the bunches are always cut early in the year.

On the first series of experiments crops have been cut for three years, since planting in October, 1909, whereas from the second series, planted in September, 1910, only two crops have been obtained, still the yield from these plots reach in several cases nearly the crop from the plots of the first series.

The quantities of artificial fertilisers, applied on some of our experimental plots, can be well considered as a world's record, as in some instances nearly 2 tons of artificial fertilisers are applied yearly, and the cost of the manure, 2 (KPN), applied twice a year, amounts to about £25 per acre, and in the cases where lime was applied in addition to £29 per acre.

Our standard manure for bananas, KPN, is made up approximately from

3 cwt. of potassium sulphate,
2½ cwt. of dried blood, or nitrate of lime, and
4 cwt. of superphosphate, per acre.

This dressing is applied twice a year, and costs, including carriage to the mountain, about 10d. per stool.

The average yield of the experimental plots with the application (KPN), taking the average for three years from eight experimental plots, was 345 bunches, with 3,035 dozen of bananas per acre per annum, at a value of, say, £38 per acre (at 3d. per dozen), the artificial fertiliser costing about £12 10s. annually.

In the experiments 2 (KPN), in which the double amount of the standard was used, we obtained an average yield of 457 bunches, with 4,330 dozen, of a value of £54 per acre. This yield gives a slightly increased net profit over the yield from the plots manured with the standard amount only, but the promise for the future yields, as based on the results of the second series already obtained, should indicate the justification for using the double amounts of fertiliser on soils similar to the soil of the experimental plots.

In looking over the table of results, we find that the yield for 1912 (to December only) in Mr. Guy's experiment No. 9 (2 KPNA) was the highest of the series, with 21 dozen bananas per stool, at a cost of 1s. 8d. for manures, whereas the unmanured plot (No. 4) yielded practically nothing.

In the second series we find experiment No. 12, 2 (KPNN), giving the record yield of 30 dozen per stool, against the yield of the unmanured plot (No. 15) with only 11 dozen (this plot, however, was not entirely unmanured, as it was manured at the time of sowing the green manure crop, which then was ploughed under), and yielding in two seasons since planting actually 42 dozen per stool.

When taking the yield for three years we find experiments 6 and 9 leading with a yield of 45 and 46½ dozen, against the total yield of only 1½ dozen from the unmanured plot (No. 4).

The increases of yields of Mr. Foote's plots, and more particularly in those of the second series, are not quite so high, and we find that the unmanured plot D gave a total yield of 15 dozen per stool in three years, and experiments B and F, 2 (KPN), gave yields of 46½ and 40½ dozen per stool.

In the second series we find experiment U yielding 26 dozen in the two seasons per stool, the same experiment on Mr. Guy's plot, No. 13, giving 34½ dozen. In this instance the plot, without salt, No. 12, yielded 42 dozen on Mr. Guy's plot, and only 23½ dozen on Mr. Foot's plot. The difference is hard to account for, but it is quite possible that the yield on Mr. Foot's second series plots will be much increased the coming season.

The addition of lime gave a slight increase only in the unmanured plots and in experiment 18, showing that the lime already supplied with the artificial fertilisers is sufficient for the plants. The results about the addition of salt are again not conclusive, as in some cases a slight increase is shown, in others again a decrease, in the yield. The variation in the yields with regard to the form of nitrogen applied as fertiliser is very slight, and not conclusive, but I have very little doubt that the best results would be obtained when the quick-acting nitrate of lime and the slow-acting organic dried blood are used alternately in the fertiliser mixtures. An occasional change in the artificial fertilisers is always beneficial to the crops.

When using such large amounts of artificial fertilisers, a waste of the humus in the soil must be particularly guarded against; every scrap of organic matter should be saved and returned to the soil, and, if necessary, green crops grown and applied as mulch.

I take here the opportunity to draw attention to an interesting series of experiments carried out by Mr. Reg. G. Bartlett, the head teacher of the State school on Buderim Mountain, in his school experimental plots, by giving an extract of his report to the Department of Public Instruction:—

"Result of Banana Manuring Experiments from 1st March, 1912, to 31st March, 1913.

(Bananas planted in September, 1911.)

	No Manure.	Manure without Potash.	Complete Fertiliser. (1.)	Complete Fertiliser. (2.)
No. of stool	7	7	7	22
No. of bunches	7	8	11	29
No. of dozen	46	63	108	282
Dozen per bunch	6·4	7·8	9·8	9·8
Cost of manure per stool ..	nil	6½d.	8½d.	1s. 4d.
Cost of manure per acre ..	nil	£9/8/6	£12/6/6	£23/4/0
Value of crop per acre, at 3d. per dozen	£28/11/9	£39/3/0	£67/2/3	£55/15/2

Complete fertiliser No. 1 consisted of—

4 lb. dried blood.

2 lb. sulphate of potash.

2½ lb. superphosphate.

Complete fertiliser No. 2 consisted of—

4 lb. nitrate of lime.

4 lb. sulphate of potash.

8 lb. superphosphate.

"As will be seen by the return, complete manure No. 1 has so far given the best result. The crop at present indicates that in the coming year No. 2 manure may show up more favourably."

In addition to this report I must state that these experiments were carried out on a piece of virgin land, rich in humus, phosphoric acid, lime, and nitrogen, but rather low in potash, although this potash exists in readily available form, and also low in available phosphoric acid.

From the results of yield given by Mr. Bartlett we find that even the unmanured plots gave a very fair return, and this return was only slightly increased by an application of artificial fertiliser containing phosphoric acid and nitrogen only, but more than doubled by dressing with complete fertilisers.

In this case, the land being virgin soil, the heavy dressing No. 2 corresponding to our 2 (KPN), is not necessary, and our ordinary standard KPN would be sufficient for some time.

The experiments of Mr. Bartlett clearly demonstrate that potash is the dominant manure for bananas, and that many banana growers who were in the habit of manuring their land with bonemeal or other incomplete manures only, must have largely wasted the money spent on these manures. They further show that even virgin land can be profitably manured, and there can be no doubt that land so treated could be kept under bananas very much longer, and, in fact, would never become so exhausted to be unsuitable for banana culture. Of course, it may be necessary to give a spell between replanting.

School experiments of this nature cannot be too much encouraged and supported, and they should be carried out in all suitable localities with various crops, in order to convince our rising generation of farmers of the advantages of intense cultivation combined with manuring.

CROP RESULTS OF THE BANANA MANURING EXPERIMENTS ON BUDERIM MOUNTAIN.

Yield in Dozen of Bananas (number of bunches in brackets).

No. of Experiments and Manures used.	Per Experiment. 1910.	1911.	1912.	1912, up to March, 1913.	Total up to March, 1913.	Per Acre. Total up to March, 1913.
EXPERIMENTAL PLOTS OF W. H. GUY, ESQ.—FIRST SERIES (PLANTED OCTOBER, 1909).						
1. K P Nb	43 (7)	119½ (15)	224½ (33)	237½ (36)	500 (58)	5393 (625)
2. 2 (K P Nb)	45 (7)	179½ (18)	376½ (50)	483½ (65)	708 (90)	7637 (971)
3. ½ (K P Nb)	24½ (6)	54½ (7)	182½ (32)	203½ (36)	282½ (49)	3047 (528)
4. Nil	35 (6)	Nil (—)	6 (2)	6 (2)	41 (8)	442 (86)
5. ½ (K Pt Nn)	127 (17)	154 (15)	235 (41)	279 (48)	560 (80)	6041 (863)
6. 2 (K Pt Nn)	197½ (26)	332½ (29)	506½ (54)	735½ (83)	1265½ (138)	13650 (1489)
7. K Pt Nn	127½ (20)	227 (21)	425½ (49)	592 (76)	946½ (117)	10204 (1262)
8. K Pt Na	68 (12)	177½ (17)	372½ (42)	473 (53)	718½ (82)	7750 (884)
9. 2 (K P Na)	157½ (21)	177½ (25)	582½ (58)	966 (106)	1301 (152)	14034 (1639)
10. K Pt Na	110 (17)	274½ (25)	540½ (54)	771½ (88)	1156 (130)	12470 (1402)
SECOND SERIES (PLANTED SEPTEMBER, 1910).						
11. 2 (K P Nb)	Poor crop of Narico Beans grown, manured with ¼ K ½ Pt ¼ Nn.	155 (22)	555 (63)	753½ (86)	908½ (108)	9799 (1165)
12. 2 (K P Nn)		174 (23)	848½ (90)	1004½ (108)	1178½ (131)	12710 (1413)
13. 2 (K P Nn) + salt ..		151 (23)	673½ (78)	816½ (96)	967½ (119)	10435 (1284)
14. 2 (K P Nb) + salt ..		176½ (25)	637½ (73)	754½ (89)	931 (114)	10042 (1230)
15. Nil		112½ (19)	312½ (45)	377 (57)	489½ (76)	5280 (820)
16. Nil + Lime ..		64 (12)	475 (64)	571 (78)	635 (90)	6489 (971)
17. 2 (K P Nn) + Lime		123 (18)	672½ (76)	801 (90)	924 (108)	9966 (1165)
18. 2 (K P Nb) + Lime		132½ (20)	751 (84)	850 (97)	982½ (117)	10596 (1262)
19. 2 (K P Nn) + Lime and Salt		86 (14)	687 (75)	772½ (85)	858½ (99)	9260 (1068)
20. 2 (K P Nb) + Lime and Salt		97½ (15)	607½ (76)	734 (89)	831½ (104)	8969 (1122)
EXPERIMENTAL PLOTS OF J. FOOTE, ESQ.—FIRST SERIES (PLANTED OCTOBER, 1909).						
A. K P Nb	287 (33)	489 (44)	500 (55)	608 (67)	1384 (144)	10999 (1144)
B. 2 (K P Nb)	359½ (36)	682½ (57)	556 (56)	722 (75)	1764 (168)	14020 (1335)
C. ½ (K P Nb)	229½ (32)	261½ (26)	353 (49)	465 (65)	956 (123)	7598 (978)
D. Nil	146 (25)	89 (11)	169 (31)	199 (37)	434 (73)	3449 (581)
E. ½ (K Pt Nn)	267½ (34)	345 (35)	284 (38)	404 (53)	1016½ (122)	8078 (970)
F. 2 (K Pt Nn)	302 (35)	631½ (56)	451 (49)	611 (69)	1544½ (160)	12275 (1272)
G. K Pt Nn	283 (35)	422 (42)	310 (39)	409 (50)	1114 (127)	8854 (1010)
H. K P Na	312½ (35)	427 (41)	262 (33)	388 (48)	1127½ (124)	8961 (987)
I. 2 (K P Na)	319½ (35)	544½ (49)	357 (40)	515 (66)	1379 (150)	10960 (1192)
K. K Pt Na	281 (34)	466½ (50)	190 (26)	286 (36)	1033½ (120)	8214 (957)
SECOND SERIES (PLANTED SEPTEMBER, 1910).						
L. K P Nb + Lime and Salt	Heavy crop of pigeon pea. All manured with ¼ K ¼ Pt ¼ Nn	135 (20)	242 (29)	435½ (58)	570½ (78)	4534 (620)
M. 2 (K P Nb) + Lime		155 (23)	340 (37)	526½ (64)	681½ (87)	5416 (691)
N. K P Nb		161½ (21)	468 (49)	658 (76)	819½ (97)	6513 (771)
O. Nil	Good crop of beans.	5 (1)	300 (38)	380½ (52)	385½ (53)	3064 (421)
P. Nil + Lime ..		— —	300 (44)	410½ (64)	410½ (64)	3262 (509)
Q. K P Nn + Lime		5½ (1)	427 (52)	695 (84)	700½ (85)	5566 (676)
R. 2 (K P Nn) + Lime	Poor crop of beans.	5 (1)	518 (56)	858 (94)	863 (95)	6859 (755)
S. 2 (K P Nn) + Lime and Salt		11½ (2)	539 (59)	834 91))	845½ (93)	6720 (739)
T. 2 (K P Nn) — ..		— —	581 (62)	894 (96)	894 (96)	7105 (763)
U. 2 (K P Nn) + Salt		— —	706 (68)	993 (96)	993 (96)	7892 (763)

K = 160 lb., K_2O applied as 320 lb. Potassium Sulphate per acre.
Nb = 40 lb., N applied as 290 lb. Dried Blood per acre.
Nn = 40 lb., N applied as 290 lb. Nitrate of Lime per acre.
Na = 40 lb., N applied as 200 lb. Ammonium Sulphate per acre.
P = 80 lb., P_2O_5 applied as 470 lb. Superphosphate per acre.
Pt = 80 lb., P_2O_5 applied as 470 lb. Thomas Phosphate per acre.

2 (K P N) means double the quantities. ½ (K P N) means half the quantities.

All manures applied twice a year, in spring and autumn.

General Notes.

SOME USEFUL HINTS.

By CHAS. P. PERRY.

It has occurred to the writer that the following items may be perused with interest and possibly with considerable benefit to the numerous readers of the "Queensland Agricultural Journal." I think every man on the land should experiment "on his own," and then, if he makes any useful discovery, he would do well to pass the details to his fellows per medium of some journal that is extensively read by the class of people affected, and the result will then be mutually beneficial.

THE FRUIT-FLY.

This destructive pest appears to be steadily increasing in numbers every year, and is the cause of very grave concern to our orchardists, and the efforts made to destroy the flies do not appear to have been attended with any marked success. I think that if all the fruitgrowers would combine, and deal determinedly with the pest, they could in a very few seasons get rid of them altogether if the following plan is adopted:—1st. Provide the flies with plenty of attractive trap fruit to lure them to extinction. 2nd. By making the orchards containing the good fruit as obnoxious to them as possible. To do the first I would recommend that a piece of land outside the orchard be enclosed with a pig-proof fence, and plant therein a number of guava trees. The guava is an ideal trap fruit; it is sweet, and ripens at the very best time of the year for the citrus fruit growers, as the guavas are ripe just before the oranges. Care should be taken to plant the trees close together, so that the branches interlace, as the fruit-fly favours a dark place. Lop off all branches that are close to the ground or that overhang fences. Now, just gather one of those large, ripe, juicy fruits, and have a look at it. You will note that it emits a strong scent, and that is one of its powerful attractions. It is perfectly smooth on the outside, and has a fairly firm skin which is easily punctured. Now open the fruit, and in the jelly-like substance amongst its seed you will see that it is swarming with the larvæ of the fruit-fly. I would here point out that, just now, you have them helpless in your hand, therefore now is your time to deal with them, because once they pass the embryo stages, and take to themselves wings and fly away, you will then admit that they are beyond your reach. Having now grown a good crop of guavas the next thing to be done is to get enough pigs inside the enclosure to eat up every fruit. They will do their own collecting, and after being pulped and pulverised, devoured and digested, in a well-set-up Berks or Yorkshire mill, none of the fruit-flies will ever emerge alive, besides providing a large quantity of first-rate feed for the animals. Do not allow poultry to peck the

fruit, or they may liberate the insects and afterwards scratch them into the ground. If you have no pigs don't grow guavas.

Having made the guava patch as attractive as possible, you now turn your attention to the orchard, where your good fruit is ripening. In order to keep the fly from visiting this, I would advise you to get a few barrels of sulphur and a sufficient number of pans to hold about a shovelful each. Set the pans in various places amongst the trees, fire them, and make a real lively stench. Fruit-flies don't like that kind of attention, and you will see they'll much prefer the guavas. The fumes must not be enclosed in any way, either by tent or otherwise, because, being pungent, they will destroy the tree as well as the vermin. If sulphur is not available, try smoking them with dry cow-dung. The flies do not relish that any more than their brother pest the mosquito. If you do the job thoroughly, I am certain you will be pleased with the result.

WHITE ANTS.

Even white ants have their uses. We all know that their nests make valuable mortar, which, when properly mixed, makes splendid floors, &c.; but I have found another use for them. When burning off old logs or stumps I discovered that if the nests are broken up with a pick and well packed around the fire, when properly burned they resemble broken bricks. When cold, if a couple of cwt. or so is spread under each fruit tree, the effect on the growth of them is marvellous. I once mentioned this to a neighbour of mine, with what result the sequel will show. This neighbour was asked by a friend to allow him to take away one or two old ant-heaps in the corner of his paddock for the purpose of making a floor for his cow-bails. "See here," said Mr. N—— very impressively, "If you had asked me for them a few months ago, I would have said take them and you're welcome to the lot, but I know better now, as I have found out that they'll be useful to me. I've got no ant-heaps to spare.

PREVENTION OF FROST-BITE BY SMOKE.

This will greatly interest canegrowers and orchardists, and especially pineapple growers and others desirous of keeping frost off their crops, but who have no timber to burn. In hot, dry weather, take a cart or dray and go around the cattle camps and gather up every cake of dry cow-dung you can find. Take them home and store in a shed, but see that the floor, walls, and roof are impervious to water. Do this until you have a big storage of it. When the frosts come along, take a few loads and set them around your orchard or plantation, and in the evening fire them, throw a couple of buckets of water over each, and go to bed. They will burn all night and emit dense volumes of smoke, and the ashes will afterwards come in useful too. That will save you turning out at 3 a.m. of a cold morning to "light up." Now, a hint to the dairyman: In the summer evenings when you are being pestered by mosquitoes, you know well enough that by lighting a little bit of dry cow dung you will clear the pest away, to the very great comfort of yourself and family, but do you ever think what a torment these wretched insects are to your cattle?

Next time the mosquitoes are troubling you, just go out and burn a few bits of dry cowdung amongst the cattle and watch how they will stand close up to the fire to smoke themselves. For payment you will get an increased flow of milk and better cream, and consequently a better filled purse.

CALOUNDRA.

Those who have visited Caloundra in the good old days when a coach and wagonette ran from Brisbane to Landsborough, and when that grand old explorer, W. Landsborough, settled down there and started sheep-farming, would to-day not recognise the place. At that time there were few houses, no hotels, no conveniences of any kind. The visitor, unless enjoying the unbounded hospitality of Mr. and Mrs. Landsborough, could camp out and bring his provisions with him. There was good sport to be got in those days—ducks and pigeons abounded; the fishing was all that could be desired. To-day all this is altered, and Caloundra is coming well to the front as a favourite seaside resort. Mr. C. W. Suttons sends us the following account of the present condition of this now rising district:—

"Caloundra, situated on the coast opposite the north end of Bribie Island, has not as yet fulfilled the expectations of the purchasers of land at the Government land sales of the early eighties. At these sales allotments fetched nearly £150 each, and in consequence, even to-day, land is dearer than would be expected in a so sparsely inhabited seaside resort. The hotel and two boarding-houses find a difficulty in accommodating the number of visitors at holiday times, and the few cottages to let are bespoken a long time in advance of the festive seasons; while through the year there is a constant stream of people (sometimes few; other times many) in search of rest or recuperation, or attracted by the beautiful natural surroundings and excellent fishing to be found there. Yet the growth of Caloundra cannot be compared with that of Southport, Redcliffe, and many other seaside places.

The soil in and around the township is of the poorest description, mostly sand; but, with liberal manuring, Mr. Rorke, the proprietor of the hotel, has grown splendid specimens of cabbage, marrows, carrots, French beans, peas, water-melons, &c., within almost a few yards of the open ocean, and this without watering. Mr. Oxenham has been very successful with pineapples, obtaining fruit up to 9 lb. in weight and of excellent flavour. Near the water the wind, often of hurricane force, is against anyone venturing in fruit trees. The absence of forest enables tomatoes, sweet potatoes, and many other things being planted all the year through, and allows the grass to retain its green colour during the winter. Among the first settlers in the district are Messrs. Westaway Brothers, who took up land at Meridan Plains, 4 or 5 miles from the coast. Their attention has mostly been devoted to cattle and breeding a few horses, but they have done some cultivation—maize, green fodder, potatoes, and vegetables for home use, meeting with excellent results. They have orange trees, which receive little or no attention, yielding yearly most prolifically and singularly free from disease. A little over

2 miles from Caloundra is a small cluster of selections owned by Messrs. G. Hawkins, C. W. Sutton, and E. F. Dingle. These selections consist of hardwood scrub and ridgy country, admirably adapted for fruitgrowing; especially citrus fruits, bananas, and pineapples. Mr. Hawkins has seedling orange trees over twenty years old of a very fine growth bearing good crops, which have not as yet needed to be cyanided. He has also Sugar and Lady's Finger bananas which have been growing the same length of time without any artificial fertilising. Mr. Sutton has both pineapples and bananas giving good results. In his first crop of pines were fruits weighing 8 and 9 lb., of superior flavour, and nearly every sucker bearing. Mr. Dingle's first crop (this year) of bananas of the Cavendish variety (Labuans) are eminently satisfactory. A few bunches were cut in twelve months from planting, some stools giving two bunches, here and there three bunches, and one four. Some of the fruit were exceptionally large, a dozen weighing 6 lb. (?—Ed.) Caloundra is 13 or 14 miles from Landsborough Railway Station; and, in time to come, when the road to the railway is improved, fruitgrowing will probably receive the attention which parts of the district merit.

Mr. Landsborough had, unfortunately, very bad luck with his sheep, which did not thrive on the coast country, and eventually the whole flock died out. Some time after his demise, his house was destroyed by fire. There are people still living at Caloundra who attended the brave old explorer's burial on the beach, and it seems strange that there is to-day nothing to mark the grave of one who did much to make Australia's history.

[We have since learned that the remains of the great explorer are to be removed to the Toowong Cemetery, when doubtless a suitable monument will perpetuate his memory.—Ed., Q.A.J.]

"THE QUEENSLAND AGRICULTURAL JOURNAL."

This number of the Journal completes the thirtieth volume of issue, dating from July, 1897. In 1904-1905 the Journal was published every two months. Since that period of retrenchment, it has appeared regularly every month, and the numerous letters of appreciation which have been received by the Department, not only from within the State but also from other parts of the world, testify to its value as an instructional medium in all branches of agriculture and stock-raising. A complete index of the thirty volumes has been prepared and will shortly be available.

SPEED OF MOTOR CARS.

An American inventor has patented an appliance that will automatically convict motorists who exceed the speed limit. The apparatus consists of a small tin box, which sets in motion a loud-sounding gong as soon as a predetermined speed has been exceeded. If the motorist does not slow down immediately, brass discs bearing the registered number of the car are shot out of the box on to the road, where they can be picked up at leisure by the policeman.

MANGROVE TANNIN.

Mr. Puran Singh, F.S.C., in the "Indian Forest Records," has the following to say on the manufacture of tannin from mangrove:—

He states that raw material is fairly abundant in Tavoy, Mergui, and Andaman Isles. If the mangrove forests are worked in scientific manner, the supply may be said to be almost inexhaustible. The current market rate of mangrove bark, which is also generally used by Burmese tanners, is about Rs. 22 per ton at Rangoon. Its cost at Mergui is Rs. 15 per ton, the freight from Mergui to Rangoon being Rs. 5 per ton. But the price of mangrove bark is liable to considerable reduction if regular and large supplies are contracted for, or if the collection is methodically undertaken by the manufacturer direct. The wholesale cost at Mergui is Rs. 15 per ton, and it stands to reason that at this rate the dealer must be making some profit after allowing for transport of the bark from the forest to the market. Though exact figures at which the bark can be extracted are not known, the total cost of the collection of bark per ton by direct agency may be safely placed at not more than Rs. 10 per ton, which would work out to about Rs. 15 per ton delivered at a factory near Rangoon. Besides, it has been noticed that the bark merchant sells his dry and fresh bark at the same rates. Hence a further reduction seems possible were the manufacturer to have his own drying-sheds in the forests and were the material to be air-dried before shipping. Taking the moisture of fresh bark to be 50 per cent., the cost of the freight per ton is reduced at once by half and the total cost is thus reduced from Rs. 15 to Rs. 12·50 per ton delivered in the vicinity of Rangoon.

If the bark is to be purchased in the open market, it must be done on its percentage contents of tannin and moisture. Mangrove barks vary much in quality, and it would be unbusinesslike to pay for good as well as for bad barks at the same rate. The price of air-dried bark containing about 30 per cent. of tannin with a moisture content of 10 per cent., say, might be fixed at the maximum of Rs. 20 per ton delivered at the factory.

YIELD OF EXTRACT PER 100 PARTS OF BARK.

It has already been shown that mangrove barks of good quality should at least yield 50 per cent. of solid extract containing 20 per cent. of moisture. For purposes of estimate, however, the ratio of bark to extract is taken at 2·6: 1 instead of 2: 1, thus allowing for the variation in the quality of the bark.

Mangrove barks when air-dried, containing 8 to 10 per cent. of moisture, yield 50 per cent. of extract, containing 20 per cent. of moisture.

A lower yield than this shows that either leaching is not thoroughly done or the quality of the bark is below the standard.

From fresh bark containing 40 per cent. of moisture, the yield of the extract with 20 per cent. water will be one-third of the total quantity of the bark used.

The total outlay of a tannin factory capable of dealing with 20 tons of bark or tan woods in 24 hours is estimated at Rs. 286·500.—"Mindanao Herald."

COTTON AT ROMA.

Judging from a sample of Uplands cotton grown during the past season at Roma, which has been brought to this office, there can be no question but that the district is eminently suited for this valuable crop. We have certainly seldom seen so fine a sample for length of staple, fineness of quality, and abundant lint. The seed was planted in the middle of October last, and the crop was gathered about the end of April, and during these six and a-half months the plants received no attention whatever. The weeds were higher than the cotton bushes, and the latter were only from 2 ft. to 3 ft. high, and loaded with pods. This was an experiment made by two young farmers in this district.

DESTRUCTION OF LANTANA.

This plant is apt to become a great nuisance in tropical countries on cultivated and pasture land, owing to its dense growth and extraordinary vitality. It appears from the "Journal d' Agriculture Tropicale" (1912, 12, 154) that an attempt is now being made in New Caledonia to combat the pest by introducing a species of fly of the Agromyzidæ family from Hawaii. The insects have been distributed in the environs of Noumea on land infested with lantana. As a result, the larvæ of the fly have been found in many of the seeds, and it is intended to extend its distribution in the colony. The result of the experiment will be watched with interest; it must be borne in mind, however, that where a new animal species has been introduced to destroy some pest it has itself sometimes proved to be injurious in other directions.—"Imperial Institute Bulletin."

A NEW CATCH CROP.

There is considerable excitement in India and Ceylon over a new indigo and a new method of handling that crop. Of course, synthetic indigo nearly ruined the natural-indigo trade several years ago, but with this much better-yielding variety (*Indigofera arrecta*) from Java, and a much improved method of handling the raw product, invented by Baron Schrottky, there is excellent reason to believe that natural indigo will come back into favour and probably turn the tables on the synthetic article.

The new variety is said to produce green material at the rate of 50 tons per hectare per year. This crop will undoubtedly be grown on most of the rubber estates in Ceylon and the Malay States, and is recommended as a catch or subsidiary crop for cocoanut plantations here in the Philippines. Not only is the plant an almost ideal soil-renovating crop, being of the legume family, but the profit from the green material itself when turned into indigo paste should be, according to recent estimates, as high as 500 pesos per hectare—which is, of course, better even than the average cocoanut crop itself.—"Mindanao Herald."

Answers to Correspondents.

LIME FOR THE SOIL.

Farmer, Marian—

1. Lime for agricultural purposes may be air-slaked before use, but another method is to take freshly-burnt stone lime, empty it out of the bags in a suitable place in a heap, and use a watering-can to slake it immediately before use. About 1 ton to the acre is used. Quicklime is only used when the soil is strongly acid, or is rendered so by the turning under of heavy green crops for green manure or prickly pear. It can be used also for lightening heavy clay soils, at the rate of from 10 to 15 cwt. per acre.

BIRDLIME.

2. Birdlime is made by boiling down linseed oil. If boiled oil is used, the concentration takes less time than with unboiled. Treat the oil as you would glue. Put it into a tin. Place the tin in a saucepan of boiling water over the fire, and let it boil slowly till thickened.

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3. In cases of fistula it is advisable to consult a veterinary surgeon.

The Markets.

PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR MAY, 1913.

Article.		MAY. Prices.
Bacon, Pineapple	lb.	8d. to 9d.
Bran	ton	£4 10s.
Butter	cwt.	98s.
Chaff, Mixed	ton	£4 to £5 10s.
Chaff, Oaten (Victorian)	,,	£4 to £5 10s.
Chaff, Lucerne	,,	£4 to £6
Chaff, Wheaten	,,	£4
Cheese	lb.	4d. to 4½d.
Citrons	cwt.	12s.
Flour	ton	£9
Hay, Oaten (Victorian)	,,	£5 to £6 10s.
Hay, Lucerne	,,	£3 to £5
Honey	lb.	2½d. to 3d.
Maize	bush.	3s. 5d. to 3s. 6d.
Oats	,,	4s. to 4s. 3d.
Pollard	ton	£5 5s.
Potatoes	,,	£5 to £9
Potatoes, Sweet	cwt.	2s. 6d. to 3s. 6d.
Pumpkins	ton	£2 10s. to £2 15s.
Rosellas	sug. bag	1s. 6d. to 2s. 6d.
Wheat, Milling	bush.	3s. 6d. to 3s. 8d.
Tomatoes	case	2s. to 4s. 4d.
Onions	ton	£9
Hams	lb.	1s.
Eggs	doz.	1s. 4d. to 1s. 8d.
Fowls	pair	2s. 3d. to 3s. 6d.
Geese	,,	6s. to 6s. 6d.
Ducks, English	,,	2s. 6d. to 3s.
Ducks, Muscovy	,,	2s. 3d. to 4s.
Turkeys (Hens)	,,	6s. to 7s.
Turkeys (Gobblers)	,,	10s. to 15s.

SOUTHERN FRUIT MARKETS.

Bananas (Fiji), G.M., per case	17s. to 18s. 6d.
Bananas (Fiji), G.M., per bunch	5s. 6d. to 9s. 6d.
Mandarins (Queensland), per case	9s. to 11s.
Oranges (Maryborough), per case	7s. to 8s.
Passion Fruit, per half-case	2s. 6d. to 3s. 6d.
Persimmons, per half case	3s. 6d. to 7s.
Pineapples (Queensland), Queens, per case	10s. to 11s.
Pineapples (Queensland), Ripleys, per case	9s. to 10s.
Pineapples (Queensland), common, per case	9s. to 10s.
Tomatoes, per half-case	2s. to 4s.
Cucumbers, per bushel case	3s. to 4s. 6d.

PRICES OF FRUIT—TURBOT STREET MARKETS.

Article.	MAY. Prices.
Apples (Eating), per case	7s. to 9s.
Apples (Cooking), per case	9s. to 10s.
Apples (American) per case	8s. to 9s.
Bananas (Cavendish), per dozen	3d. to 4d.
Bananas (Sugar), per dozen	2½d. to 3½d.
Custard Apples, per case	2s. to 3s.
Grapes, per lb.	...
Lemons, per case	6s. to 6s. 6d.
Lemons (Italian), per case	...
Mandarins, per case	3s. 6d. to 8s.
Mangoes, per case	...
Nectarines, per case	...
Oranges (Navel), per case	...
Oranges (other), per case	3s. to 4s.
Papaw Apples, per case	1s. 6d. to 3s. 6d.
Passion Fruit, per quarter-case	4s. to 5s.
Peaches, per quarter-case	...
Peanuts, per lb.	2½d. to 3½d.
Persimmons, per case	...
Pineapples (Ripley), per dozen	1s. 6d. to 3s. 6d.
Pineapples (Rough), per dozen	1s. to 3s.
Pineapples (Smooth), per dozen	2s. 6d. to 4s.
Plums, per case	...
Rockmelons, per doz.	...
Strawberries, per tray	2s. to 3s.
Tomatoes, per quarter-case	2s. to 3s.
Watermelons, per dozen	...

TOP PRICES, ENOGGERA YARDS, APRIL, 1913.

Animal.	APRIL. Prices.
Bullocks	£8 12s. 6d. to £9 12s. 6d.
Cows	£6 7s. 6d. to £7 7s. 6d.
Merino Wethers	19s. 3d.
Crossbred Wethers	23s. 6d.
Merino Ewes	16s.
Crossbred Ewes	17s. 6d.
Lambs	18s.
Pigs (Porkers)	...

ENOGGERA FAT STOCK STATISTICS, BRISBANE, APRIL, 1913.

THE FOLLOWING ARE THE SALES OF FAT STOCK AT ENOGGERA SALE YARDS DURING THE MONTH OF APRIL, 1913.

—	Sheep.	Lambs.	Cattle.	Calves.
Fenwick and Co.	12,452	1,034	1,609	505
Morehead's Ltd.	10,927	405	272	160
Winchcombe, Carson, Ltd.	4,451	159	799	80
Aust. Estates and M. Co., Ltd. ...	3,974	826	411	55
Sturmfel's Ltd.	3,594	706	476	64
Dalgety and Co., Ltd.	3,465	462	1,086	208
John Bridge and Co., Ltd.	3,223	157	401	115
N.Z. Loan and M.A. Co., Ltd. ...	1,657	677	8	24
Mactaggart Bros.	1,551	...	324	113
Thos. Moyes	175	...	216	...
...	45,469	4,426	5,602	1,224

FENWICK AND Co., Salesmen, Brisbane, report under date 14th instant:—

SUNDRIES (12th instant).—All lines were in good demand at late rates, and we advise owners sending along their consignments.

MARSUPIAL SKINS (8th May).—We offered a nice quality catalogue, and found the demand exceptionally keen for all small and medium wallabies. Scrub wallabies of these sizes advanced 2s. per dozen on our last sale, while other descriptions of wallabies showed a bigger advance. Large skins were in good demand at late rates. Kangaroos were weaker, but wallaroos, whiptails, and goat skins sold well. We sold rock wallabies to 30s. 6d. per dozen, this being a record for the Brisbane market. We can strongly recommend owners sending forward, as prices for wallabies are the highest on record. We sold 12,713. Our next sale will be held on Monday, the 19th instant, when we expect a good demand for all lines, with furriers' lines in special demand.

HIDES (13th instant).—We offered a very attractive catalogue to a full attendance of buyers. Competition ruled very keen, and values for well-got-up lines were ⅛d. higher, while other descriptions ruled from par to ⅛d. dearer. Substance hides sold to better competition, and 14¾d. per lb. was paid for an exceptionally stout hide. We sold 2,312 hides.

CALFSKINS AND YEARLINGS (13th May).—Both lines were in good demand at last sale's rates. Best calfskins sold to 12½d. per lb., and best butchers' yearlings to 7½d., and special lines to 8d. per lb. We sold 1,876.

SHEEPSKINS (9th May).—All lines were in good demand. Thirds to half-wools and three-quarters to full-wools realised late rates, but other lengths ruled from ¼d. to ½d. per lb. lower. We sold 3,934.

TALLOW (9th May).—Competition ruled very keen, and values advanced 2s., prime tallow realising £30 10s. per ton. We sold 83 tierces and 1 quarter cask.

Statistics.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF APRIL IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING APRIL, 1912 AND 1913, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	April.	No. of Years' Records.	April, 1913.	April, 1912.
North Coast.				
	In.		In.	In.
Atherton	4·94	11	1·79	5·16
Cairns	13·85	25	6·82	4·71
Cardwell	9·58	25	5·47	23·40
Cooktown	9·39	25	6·94	1·06
Herberton	4·78	25	3·59	1·40
Ingham	8·87	20	8·33	14·73
Innisfail	22·63	25	11·11	56·14
Mossman	...	...	5·46	6·40
Townsville	3·22	23	7·75	4·51
Central Coast.				
Ayr	2·78	25	6·63	1·16
Bowen	2·74	25	6·98	0·59
Mackay	6·46	25	5·94	3·56
Proserpine	...	...	8·70	2·20
St. Lawrence ...	3·04	25	1·41	1·08
South Coast.				
Crohamhurst ...	...	...	14·73	...
Biggenden	1·73	14	1·73	0·15
Bundaberg	3·10	25	5·01	Nil
Brisbane	3·69	62	6·35	0·72
Childers	2·65	17	3·24	0·17
Esk	2·77	25	2·03	0·36
Gayndah	1·57	25	0·14	0·16
Gympie	3·17	25	6·42	0·37
Glasshouse Mount's	...	...	...	...
Kilkivan	2·06	25	1·67	0·06
Maryborough ...	3·41	25	5·98	0·32
South Coast—continued:	In.		In.	In.
Nanango	2·07	25	1·39	0·23
Rockhampton ...	2·54	25	1·35	0·01
Woodford	3·93	25	11·26	0·94
Yandina	4·16	19	15·69	0·88
Darling Downs.				
Dalby	1·68	22	0·32	Nil
Emu Vale	1·21	17	0·74	,,
Jimbour	1·48	24	0·20	,,
Miles	1·55	25	0·80	,,
Stanthorpe ...	1·62	22	0·84	,,
Toowoomba ...	2·73	22	1·78	0·66
Warwick	1·47	22	0·29	0·02
Maranoa.				
Roma	1·23	21	1·61	0·03
State Farms, &c.				
Gatton College ...	1·84	14	0·63	...
Gindie	1·42	13	1·19	0·63
Kamerunga Nurs'y	13·03	23	...	...
Kairi	...	...	...	...
Sugar Experiment Station, Mackay	...	...	...	...
Bungeworgorai ...	...	...	1·66	...
Warren	...	...	...	...
Hermitage ...	...	...	...	...

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for April this year and for the same period of 1912, having been compiled from telegraphic reports, are subject to revision.

Farm and Garden Notes for July.

FIELD.—The month of July is generally considered the best time to sow lucerne, for the reason that the growth of weeds is then practically checked, and the young lucerne plants will, therefore, not be choked by them, as would be the case if planted later on in the spring. If the ground has been properly prepared by deep ploughing, cross-ploughing, and harrowing, and an occasional shower occurs to assist germination and growth, the lucerne will thrive so well that by the time weeds once more appear it will be well able to hold its own against them. From 10 to 12 lb. of seed will be sufficient for an acre. This is also the time to prepare the land for many field crops, such as potatoes, maize, oats, and barley for green fodder; also, rye, vetches, tobacco, cotton, sugar-cane, field carrots, mangolds, swedes, canaigre, &c. Early potatoes, sugar-cane, and maize may be planted in very early districts, but it is risky to plant potatoes during this month in any districts liable to late frosts or in low-lying ground. Under such conditions, it is far better to wait until well into the following month. The greatest loss in potatoes and sugar-cane has been, on more than one occasion, experienced in September, when heavy frosts occurred in low-lying districts in the Southern portion of the State. During suitable weather, rice may be sown in the North. The coffee crop should now be harvested, and yams and turmeric unearthed.

KITCHEN GARDEN.—Should showery weather be frequent during July, do not attempt to sow seeds on heavy land, as the latter will be liable to clog, and hence be injurious to the young plants as they come up. The soil should not be reworked until fine weather has lasted sufficiently long to make it friable. Never walk over the land during wet weather with a view to sowing. The soil cakes and hardens, and good results cannot then be expected. This want of judgment is the usual cause of hard things being said about the seedsman. In fine weather, get the ground ploughed or dug, and let it lie in the rough till required. If harrowed and pulverised before that time, the growth of weeds will be encouraged, and the soil is deprived of the sweetening influences of the sun, rain, air, and frost. Where the ground has been properly prepared, make full sowings of cabbage, carrot, broad beans, lettuce, parsnips, beans, radishes, leeks, spring onions, beetroot, eschalots, salsify, &c. As westerly winds may be expected, plenty of hoeing and watering will be required to ensure good crops. Pinch the tops of broad beans which are in flower, and stake up peas which require support. Plant out rhubarb, asparagus, and artichokes. In warm districts, it will be quite safe to sow cucumbers, marrows, squashes, and melons during the last week of the month. In colder localities, it is better to wait till the middle or end of August. Get the ground ready for sowing French beans and other spring crops.

FLOWER GARDEN.—Winter work ought to be in an advanced state. The roses will now want looking after. They should already have been pruned, and now any shoots which have a tendency to grow in wrong directions should be rubbed off. Overhaul the ferneries, and top-dress with a mixture of sandy loam and leaf mould, staking up some plants and thinning out others. Treat all classes of plants in the same manner as the roses where undesirable shoots appear. All such work as trimming lawns, digging beds, pruning, and planting should now be got well in hand. Plant out antirrhinums, pansies, hollyhocks, verbenas, petunias, &c., which were lately sown. Sow zinnias, amaranthus, balsam, chrysanthemum tricolour, marigold, cosmos, coxcombs, phloxes, sweet peas, lupins, &c. Plant gladiolus, tuberoses, amaryllis, pancratium, ismene, crinums, belladonna, lily, and other bulbs. Put away dahlia roots in some warm, moist spot, where they will start gently and be ready for planting out in August and September.

Orchard Notes for July.

THE SOUTHERN COAST DISTRICTS.

The notes for the month of June apply to July as well. The first crop of strawberries will be ripening during the month, though extra early fruit is often obtained in June, and sometimes as early as May, under especially favourable conditions. Look out for leaf-blight, and spray for same with Bordeaux mixture, also watch for the first signs of the grey mould that attacks the fruit, and spray with the sulphide of soda wash. The larvæ of the cockchafer, that eats the roots of strawberries, should be looked for, and destroyed whenever found. Pruning of citrus and other fruit trees may be continued; also, the spraying with lime and sulphur. Where the ringing borer, that either attacks the main trunk or the branches at or near where they form the head of the tree, is present, the main stems and trunks should either be painted or sprayed with the lime and sulphur wash during the month, as the mature beetles that lay the eggs that eventually turn to the borers sometimes make their appearance during the month, and unless the trees are protected by the wash they lay their eggs, which hatch out in due course and do a lot of damage. Keep the orchard clean, so that when the spring growth takes place the trees may be in good condition. There is usually a heavy winter crop of pineapples ripening during this and the following months, particularly of smooth leaves. See that any conspicuous fruits are protected by a wisp of grass, as they are injured not only by frost but by cold westerly winds.

THE TROPICAL COAST DISTRICTS.

See the instructions given for the month of June. Keep the orchards clean and well worked. Prune and spray where necessary.

THE SOUTHERN AND CENTRAL TABLELANDS.

Where pruning of deciduous trees has not been completed, do so this month. It is not advisable to leave this work too late in the season, as the earlier the pruning is done after the sap is down the better the buds develop—both fruit buds and wood buds; thus securing a good blossoming and a good growth of wood the following spring.

Planting can be continued during the month; if possible, it should be finished this month, for though trees can be set out during August, if a dry spell comes they will suffer, when the earlier planted trees, which have had a longer time to become established, will do all right—provided, of course, that the land has been properly prepared prior to planting, and that it is kept in good order by systematic cultivation subsequent to planting.

Do not neglect to cut back hard when planting, as the failure to do so will result in a weakly growth.

As soon as the pruning is completed, the orchards should get their winter spraying with the sulphur limewash, and either with or without salt, as may be wished. See that this spraying is thoroughly carried out, and that every part of the tree is reached, as it is the main treatment during the year for San José and other scale insects, as well as being the best time to spray for all kinds of canker, bark-rot, moss, lichens, &c.

Where the orchard has not been ploughed, get this done as soon as the pruning and spraying are through, so as to have the land in good order for the spring cultivation. See that the work is well done, and remember that the best way to provide against dry spells is to keep moisture in the soil once you have got it there, and this can only be done by thorough and deep working of the soil.

When obtaining trees for planting, see that they are on good roots, and that they are free from all pests, as it is easier to prevent the introduction of pests of all sorts than to eradicate them once they have become established. Only select those varieties that are of proved merit in your district; do not plant every kind of tree that you see listed in a nurseryman's catalogue, as many of them are unsuited to our climate. The pruning of grape vines may be carried out in all parts of the tablelands other than the Stanthorpe district, where it is advisable to leave this work as long as possible, owing to the danger of spring frosts.

Where grape vines have been well started and properly pruned from year to year, this work is simple; but where the vines have become covered with long straggling spurs, and are generally unsightly, the best plan is to cut them hard back, so as to cause them to throw out good strong shoots near the main stem. These shoots can be laid down in the place of the old wood in following seasons, and the whole bearing portion of the vine will be thus renewed.

Where vineyards have been pruned, the prunings should be gathered and burnt, and the land should receive a good ploughing.